FACT SHEET FOR STATE WASTE DISCHARGE PERMIT ST-5328
ConAgra Foods Packaged Foods Company, Inc.
d/b/a Lamb-Weston (Connell Facility)

SUMMARY

The Lamb-Weston Connell facility processes freshly harvested and stored potatoes into french fries and formed potato products year around. Process wastewater is pre-treated by a constructed wetland system then land applied to approximately 1200 acres for final treatment. A lined pond is available to store the wastewater during the winter non-growing season. Nitrogen and water loading from the wastewater to the sprayfields have been less than the crop requirements.

The dry conditions of an upgradient well in one part of the sprayfield system and the absence of ground water monitoring in another part, due to the absence of unconfined ground water, preclude the determination of background ground water conditions for the most of the sprayfield site.

In place of ground water-based limits to evaluate the operations of the sprayfields and the protection of the ground water beneath the site, an expanded soil monitoring plan has been put into the permit. In addition, the Permittee will be required to submit a long-term (10 yr) crop plan that estimates the nitrogen and water loading capacity of the sprayfields, the leaching requirement, and a description of how the leaching requirement will be met and protect the ground water. The net nitrogen loading to the sprayfields will be limited to the crop requirements as determined and presented in the most recent Irrigation and Crop Plan.

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INTRODUCTION

This fact sheet is a companion document to the draft State Waste Discharge Permit No. **ST-5328**

ConAgra Foods Packaged Foods Company, Inc. . The Department of Ecology (the Department) is proposing to issue this permit, which will allow discharge of wastewater to waters of the State of Washington. This fact sheet explains the nature of the proposed discharge, the Department's decisions on limiting the pollutants in the wastewater, and the regulatory and technical bases for those decisions.

Washington State law (RCW 90.48.080 and 90.48.162) requires that a permit be issued before discharge of wastewater to waters of the state is allowed. Regulations adopted by the state include procedures for issuing permits (Chapter 173-216 WAC), and water quality criteria for ground waters (Chapter 173-200 WAC). They also establish requirements which are to be included in the permit.

This fact sheet and draft permit are available for review by interested persons as described in Appendix A--Public Involvement Information.

The fact sheet and draft permit have been reviewed by the Permittee. Errors and omissions identified in these reviews have been corrected before going to public notice. After the public comment period has closed, the Department will summarize the substantive comments and the response to each comment. The summary and response to comments will become part of the file on the permit and parties submitting comments will receive a copy of the Department's response. The fact sheet will not be revised. Changes to the permit will be addressed in Appendix D--Response to Comments.

GENERAL INFORMATION	
Applicant	ConAgra Foods Packaged Foods Company, Inc.
Facility Name and Address	d/b/a Lamb-Weston 811 Gum Street Connell, WA 99326
Type of Facility	Potato processing
Type of Treatment:	Constructed wetland and land treatment via spray irrigation
Discharge Location	S. of State Hiway 260, E. of Warehouse Rd, W. of Moon Rd in Sec. 33 and 34, T. 14N, R. 31 E.W.M. Latitude: 46° 39' 22" N Longitude: 118° 55' 13" W. N. of State Hiway 260, along Moon Rd., E ½ Sec. 10, W ½ Sec. 11, NW ¼ Sec 14, T. 14N, R. 31 E.W. M. Latitude: 46° 42' 52" N Longitude: 118° 53' 52" W.
Contact at Facility	Name: Mike DeWulf, Engineering Manager Telephone #: 509-234-5511, Ext. 66700

GENERAL INFORMATION	
Responsible Official	Name: Dave Larson Title: Operations Manager Telephone #: 509-234-5511 ext: 200 FAX # 234-5515

BACKGROUND INFORMATION

DESCRIPTION OF THE FACILITY

The Lamb-Weston facility at Connell, WA (Franklin Co) is located along State Highway 395 approximately 25 miles north of Pasco; (Fig. 1). Freshly harvested and stored potatoes are processed into French fries and formed potato products year around. Wastewater from the process is filtered, settled, biologically treated in a constructed wetland, and land applied via spray irrigation for final treatment. The facility has been and is currently permitted to discharge the wastewater via spray irrigation; permit No. ST-5328).

INDUSTRIAL PROCESSES

Raw potatoes are washed, steam pealed, preheated and cut into French fries, which are then blanched, dried, batter coated (optional), fried, cooled, frozen, and finally packaged. Formed potato products are also produced by shredding the smaller, shorter fries. Soy based oils are predominately used for cooking.

According to information presented in the permit application, approximately 2.5 million pounds of raw potatoes are processed each day. Except for scheduled downtimes for O&M and sanitation, the facility operates year around, 24hrs/day.

The water used to wash the raw potatoes is reused until its solids (dirt) content requires it to be discharged to a settling pit. The settled dirt is land applied and the water is sent to the process wastewater system.

TREATMENT PROCESSES

The treatment process is comprised of pretreatment, a constructed wetland for biological treatment, and land treatment via spray irrigation.

Pretreatment

All process wastewater at the facility is collected in an open floor trench system and is sent to a clarifier via a single discharge pipe. The water is screened before entry into the clarifier. The clarifier solids are dewatered using a vacuum drum system and hauled off site for cattle feed. The solids water is sent through a CAF (cavitation air flotation system) to remove additional solids.

Water from the clarifier and CAF unit is pumped (metered) to an earthen walled and lined 700,000 gallon surge basin and then to the first cells of the constructed wetland.

Constructed wetlands

The wetlands were engineered and constructed on land previously used for general agriculture, and all of the wetland components are HDPE lined. The wetland system (39.5 acres) is comprised of three parts that were designed to perform different treatment functions.

1. The W1 and W2 series (Fig. 2) are open water wetlands that have been planted in cattails and other emergent plants. They are operated in parallel. The initial cells (W1.1, W1.2,

W2.1, W2.2) were designed primarily as solids traps. The remaining W1 and W2 cells allows for the mineralization of organic nitrogen and the reduction of COD, nitrification and denitrification, and volatilization to remove nitrogen. The effluent from the W1 and W2 series has showed a 90% reduction in TSS and COD (Kirkbride Group, 1998).

2. The W3 series (Fig 2) are downflow sand beds and were designed and are operated to promote the nitrification process. Wastewater from the W1 and W2 series is sprinkled on the beds and the ammonia nitrogen is converted to nitrate nitrogen as the water percolates through the beds. An underdrain system collects the wastewater and is sent to the next series.

3. The W4 series (Fig 2) are open water wetlands with emergent vegetation that are operated to promote denitrification. A small stream of raw wastewater is added to provide a carbon source for the process. The water from this series is sent to a lined storage impoundment (135 million gallons) from which it is pumped to the land treatment fields.

Land treatment

The land treatment sprayfields are located in two separate areas:

1. The LWC Farm fields are owned by Lamb-Weston and are located just west of the processing facility (Figs 1 and 3). They are comprised of center pivot, hand sets, and wheel lines, and total 525 acres.

2. The Paradise fields are located approximately three miles north of the LWC Farm site (Figs. 1 and 4) and are leased by Lamb-Weston. These are center pivot fields that total approximately 635 acres.

Wastewater is pumped from the storage pond to a central Mix Tank (Fig 3) where the wastewater is directed to the different fields and applied using center pivot, wheel line, or hand line systems. The wastewater can be mixed at the tank with supplemental irrigation water, but is generally not.

Information presented in the annual Farm Summary Operations reports was reviewed to gather information on the sprayfields for the period 1999-2003 (2000a, 2001, 2002, 2003, 2004).

Nitrogen loading

	Annual Process Wastewater (MG)	Net wastewater nitrogen (lbs)	Nitrogen removed by crops (lbs)	Leaching fraction
1999	293	71,800	217,000	0 - 11%
2000	310	83,600	211,300	0 - 20%
2001	283	92,200	208,000	0 – 5.5%
2002	311	69,700	356,000	0 - 2.7%
2003	305	100,200	428,300	0 – 3.1%

The amount of nitrogen removed by the crops has consistently been greater than the amount added from the wastewater. The variation in the amount of nitrogen removed is a function, in part, of crop yield. The large increase in nitrogen uptake in 2002 relative to nitrogen loading was attributed to higher crop yields of alfalfa and that more fields were cropped in alfalfa.

The net amount of nitrogen applied to the land treatment fields from the process wastewater accounts for nitrogen loss via volatilization and denitrification. The values are low when compared to similar potato processing facilities. This is due to the low nitrogen content of the wastewater as a result of treatment by the wetlands. A comparison of wastewater nutrient data for the Connell facility with a similar type processing facility not using a biological pretreatment system shows the difference in strength of the final wastewater applied to the sprayfields.

	Connell facility	Similar facility
Avg. TKN	32.6 mg/L	132 mg/L
Avg. ammonia-N	25.6 mg/L	53.8 mg/L
Avg. COD	149 mg/L	2329 mg/L

Net nitrogen loading to the Connell facility fields ranged from 1 – 173 lbs/acre during the period 1999 through 2003. Most fields showed a negative nitrogen balance; more nitrogen removed by crop uptake then by nitrogen added by wastewater plus commercial fertilizer. Supplemental commercial fertilizer is sometimes added to meet the crop requirements.

The volume of water applied to each field is metered. Hydraulic loads to each field vary each year resulting in leaching fractions (% net water input percolated past the root zone) from 0 – 20% with values generally being less than 5% since 2000. Supplemental water is generally required to meet the crop demand.

COD and Fixed Dissolved Solids loading

	COD (lbs/acre)	Fixed Dissolved Solids (lbs/acre)
1999	24 - 604	356 - 7289
2000	9 - 594	184 - 6438
2001	54 - 674	868 – 7374
2002	116 – 415	925 – 4840
2003	8 – 671	111 - 6175

Load values for COD ranged from 8 – 674 lbs/acre. Daily load rates have always been less than the 50-100 lbs/acre/day that is sometimes considered the maximum acceptable load to prevent anoxic soil conditions.

Salt loading ranged from 111 – 7374 lbs/acre. Because salt loads exceed crop requirements, irrigation management is used to control soil salinity by leaching. This is typical of most vegetable/potato land treatment systems.

GROUND WATER

The site is located in the Columbia Plateau that is underlain with basalt and covered by sedimentary deposits composed of sand, gravel, cobbles, and boulders. The Columbia River Basalt Group and the interflow materials make up the aquifer system at the site.

Ground water flows horizontally in the interflow zones and there is minimal vertical movement between the zones through the basalt fractures. Ground water in the uppermost basalt flows is usually confined while deeper zones have confined aquifer systems. Most irrigation wells are finished in the deeper water bearing zones. Ground water pumping may have caused the direction of general ground water flow at the site to change from southwesterly in area around the site to southeast. Based on ground water elevations collected between 2001 and 2004, the direction of ground water flow has predominately been to the east-southeast.

LWC Farm

The uppermost ground water at this sprayfield site is located in two separate stratigraphic loactions; the Wanapum interflow zone (IFZ) and the T-Lake water bearing zone (WBZ) encountered within the Saddle Mountain basalt. The Wanapum IFZ is located between basalt flows and is in the easterly portion of the site. It is monitored by wells MW-15, -16, and -17; Fig. 3. Results of the most recent hydrogeologic study of the site concluded that the presence of a thick low permeable formation above the basalt at MW-17, and the presence of a thick and poorly fractured basalt layer at MW-15, -16, and -17 provide conditions of a low risk of any impact to the ground water from the fields (CES, 1999b).

The T-Lake WBZ is in the westerly portion of the site west of Buehler Rd. and is monitored by MW-12, -18, and -19 (Fig. 3.). It is topographically approximately 150ft higher than the Wanapum IFZ and does not appear to be hydraulically connected to it (CES, 1999b). The 1999 hydrogeologic report states that the direction of ground water flow in this zone is to the south, with MW-18 being the most upgradient. However, ground water elevation data for the period January 2000 through December 2003 shows ground water flow to be to the east-southeast, with MW-12 (mean elev. 962.45 ft) being the most upgradient well; MW-18, 954.76 ft; MW-19, 954.08 ft. Discharge from the T-Lake WBZ may contribute to the flow from the spring located near the Farm Drain adjacent to the C6 sprayfield; Fig. 3. The source of the T-Lake water is unknown but may be seepage from a nearby irrigation canal.

MW-18 and -19 were installed in September 1999 to provide additional ground water data for the T-Lake WBZ, and potentially function as up- and downgradient wells, respectively. MW-12 had previously been installed (Nov. 1992).

The average nitrate and TDS values at MW-18 (7.3 and 280 mg/L; Addendum 1) are below the ground water criteria. The average nitrate value at MW-12 (10.5 mg/L) is higher than the MW-19 value (6 mg/L). The average TDS concentrations at MW-12 and MW-19 are similar (371 and 351 mg/L).

Paradise fields

Lamb-Weston's review of well logs in the vicinity of the site showed a median depth to the basalt was 18ft below ground surface (bgs) and the median well depth is 1200ft bgs. The results of exploratory borings showed the presence of hard, unfractured basalt at intervals of five feet or greater and that unconfined ground water is not present beneath the site (CES, 1999b). Therefore, monitoring wells were not installed at the site.

GROUND WATER QUALITY

LWC Farm -Wanapum IFZ

A summary of ground water data for MW-15 and -16 is presented in Addendum 1. The average values for nitrate and TDS at MW-15 (9.3 and 303 mg/L) are less than the ground water criteria (10 and 500 mg/L), while those for MW-16 (17.8 and 586 mg/L) exceed the criteria. A time series analysis of the nitrate and TDS data at MW-16 shows a decreasing trend for both parameters since January 1999. TDS values in late 2003 were less than 500 mg/L and nitrate values are near 11-12 mg/L.

Both wells were installed in January 1995, have nearly identical well depths (approximately 175ft), and are screened at identical depths (150-170ft). The water levels in both wells only vary slightly during the year.

MW-17 has been dry since it was installed, therefore upgradient conditions are not known for the Wanapum IFZ.

LWC Farm --T-Lake WBZ

The average nitrate concentration at MW-12 (10.5 mg/L) is slightly higher than the ground water criteria (10 mg/L), while the values at MW-18 and -19 (7.3 and 6 mg/L) are less (Addendum 1). The average TDS value at each well is less than the ground water criteria value (500 mg/L).

Other Ground Water Data

Ground water data has been collected from other wells located near an area that was previously the land treatment site (Fig 3, Old Farm). The irrigation of wastewater to these fields stopped in 1996. Data from these wells (MW-1R, MW-2, MW-11) shows nitrate and TDS values generally below the ground water criteria. MW-10 has been dry for many years.

Farm Drain

A subsurface drainage collection system extends beneath fields C4, C5, and C8 and day lights at a Farm Drain located along the southern edge of the LWC Farm site; Fig. 3. A review of data collected at the drain shows nitrate and TDS values below the ground water criteria; Addendum 1.

PERMIT STATUS

The previous permit for this facility was issued on December 23, 1998 and expired on June 30, 2004. A temporary permit was issued in a letter dated July 1, 2004.

An application for permit renewal was submitted to the Department on December 23, 2003 and accepted by the Department on February 13, 2004.

SUMMARY OF COMPLIANCE WITH THE PREVIOUS PERMIT

The facility last received an inspection on November 19, 2003. The facility was found to be in general compliance with the conditions of the permit.

During the history of the previous permit, the Permittee has remained in compliance based on Discharge Monitoring Reports (DMRs) and other reports submitted to the Department and inspections conducted by the Department.

WASTEWATER CHARACTERIZATION

The concentration of pollutants in the discharge was reported in the permit application and in discharge monitoring reports. The proposed wastewater discharge prior to land application is characterized for the following parameters as presented in the permit application.

Table 1: Wastewater Characterization

Parameter	Concentration
COD (mg/L)	Range: 69-364 Avg = 149
Conductivity (umhos/cm)	Range: 2570-3150 Avg = 2856
Ammonia-N (mg/L_	Range: 1.9-50.8 Avg = 25.6
pH (s.u.)	Range: 7.5-9.03
Fixed dissolved solids (mg/L)	Range: 1318-1926 Avg = 1582
Nitrate+Nitrite-N (mg/L)	Range: 0.1-154 Avg = 13.5
TKN – N (mg/L)	Range: 8.3-77 Avg = 32.6
Total phosphate-P (mg/L)	Range: 28-32.9 Avg = 30.5
Sodium (mg/L)	Range: 205-217 Avg = 211
Potassium (mg/L)	Range: 344-367 Avg = 356
Chloride (mg/L)	Range: 265-306 Avg = 285

PROPOSED PERMIT LIMITATIONS

State regulations require that limitations set forth in a waste discharge permit must be either technology- or water quality-based. Wastewater must be treated using all known, available, and reasonable treatment (AKART) and not pollute the waters of the State. The minimum requirements to demonstrate compliance with the AKART standard were determined in the

engineering reports (CES, 1994; CES, 1995; CES, 1999a) in conformance with *Guidelines for the Preparation of Engineering Reports for Industrial Wastewater Land Application Systems*, May 1993.

The more stringent of the water quality-based or technology-based limits are applied to each of the parameters of concern. Each of these types of limits is described in more detail below.

TECHNOLOGY-BASED EFFLUENT LIMITATIONS

All waste discharge permits issued by the Department must specify conditions requiring available and reasonable methods of prevention, control, and treatment of discharges to waters of the state (WAC 173-216-110). The following permit limitations are necessary to satisfy the requirement for AKART:

1. Wastewater shall be land applied via spray irrigation not to exceed agronomic rates (as defined in the Department's ground water implementation guidance) for total nitrogen and water, and at rates for other wastewater constituents that are protective of background ground water quality.
2. Total nitrogen and water shall be applied to the sprayfields as determined by a current irrigation and crop plan.
3. The system must be operated so as to protect the existing and future beneficial uses of the ground water and not cause a violation of the ground water standards.
4. Average daily flow to the wetland (from the clarifier) of 1.84 MGD. This is based on the design flow for the wetland system (The Kirkbride Group, 1998).

GROUND WATER QUALITY-BASED EFFLUENT LIMITATIONS

In order to protect existing water quality and preserve the designated beneficial uses of Washington's ground waters including the protection of human health, WAC 173-200-100 states that waste discharge permits shall be conditioned in such a manner as to authorize only activities that will not cause violations of the Ground Water Quality Standards. The goal of the ground water quality standards is to maintain the highest quality of the State's ground waters and to protect existing and future beneficial uses of the ground water through the reduction or elimination of the discharge of contaminants to ground water [WAC 173-200-010(4)]. This goal is achieved by [GW Implementation Guidance, Abstract, page x]:

1. Requiring that AKART (all known available and reasonable methods of prevention, control and treatment) be applied to any discharge;
2. Application of the antidegradation policy of the ground water quality standards. This policy mandates protecting background water quality and preventing degradation of water quality which would harm a beneficial use or violate the ground water standards; and
3. Establishing numeric and narrative criteria for the protection of human health and welfare in the ground water quality standards.

Numeric ground water criteria (maximum contaminate concentrations) are based on drinking water quality criteria. Applicable criteria concentrations are listed below:

Table 2: Ground Water Quality Criteria

Total Dissolved Solids	500 mg/L
pH	6.5 to 8.5 s.u.
Nitrate	10 mg/L

Wanapum IFZ and Paradise fields

In response to the dry well conditions at upgradient well MW-17 at the LWC Farm site and the results of the hydrogeology report on the Paradise fields (CES, 1999b) that unconfined ground water is not present at the site and no monitoring wells were installed, Ecology requested that Lamb-Weston develop and submit a soil monitoring plan for the Wanapum IFZ and Paradise field sites. The plan would provide data to determine if the operations of the sprayfields are protective of the ground water. A Soils Monitoring Plan was submitted by Lamb-Weston in September 2000 (CES, 2000b).

The plan adds to what is already required in Lamb-Weston's discharge permit. It includes:

1. Implement monthly soil moisture monitoring at every field and at one-foot intervals to 60 inches or auger refusal.
2. Conduct soil testing in the fall and spring at each field for nitrate, ammonium, soluble salts and soil moisture at one-foot increments to 5ft or until auger refusal.

The protection of ground water would be indicated by:

1. The annual water balance showing the leaching fraction to be equal to or less than the leaching requirement.
2. The trend in soil nitrogen shows that nitrogen is being managed in the root zone
3. Nitrogen loading is balanced with nitrogen uptake by the crops.
4. The trend in soil soluble salts shows they are being managed within the root zone and not causing an exceedance of crop tolerance limits.

Given the absence of an upgradient well for the LWC Farm fields above the Wanapum IFZ and the absence of unconfined ground water at the Paradise Field site, the Soils Monitoring Plan will be implemented in the permit in place of water quality-based ground water limitations for these sprayfield sites.

T-Lake WBZ – Background Ground Water Quality

Upgradient ground water quality data at MW-12 (Jan 2000 – December 2003; Addendum 1) was analyzed to determine background conditions for the ground water in the T-Lake WBZ. The procedures for estimating background water quality are contained in the Guidance Document for

Implementing the Ground Water Standards (Ecology, 1996). Background water quality is defined as the 95 percent upper tolerance interval with a 95 percent confidence.

Nitrate:

An outlier analysis showed that the values for March and November 2002 were outliers; they were removed from the analysis. There was no seasonality in the data. There was a significant trend in the remaining data; n=58, 95% C.I. Starting with the January 1999 value, data values were progressively eliminated until no significant trend was found. The final data set was for the period June 2001 – December 2003 (n=29; Appendix C). A parametric tolerance limit (background) of 15.8 mg/L was determined.

Nitrate values at the downgradient wells (MW-18 and -19) were compared to the background value; Fig. 5. Nitrate values at both wells have been consistently less than the background value. Nitrate values at MW-18 show a steady declining trend since late 2001 while values at MW-19 show an increase in variability. Lamb-Weston's 2001 Farm Operations Summary reported a change in the testing lab beginning in July and August 2001 (CES, 2002). Information presented later by Lamb-Weston revealed that the new lab generally uses Standard Methods where as the previous lab used EPA methods. The test methods are different but both are valid and accepted by Ecology.

Total Dissolved Solids:

The MW-12 data showed no statistical outliers, no seasonality, and no significant trend (n = 60; Appendix C). A parametric tolerance limit (background) of 419.7 mg/L was determined.

Figure 6 shows a comparison of the background value to TDS values at the downgradient wells; MW-18 and MW-19. With a few exceptions, values at both wells were less than the background value. The data for both wells shows a slight decreasing trend since mid-2001.

ENFORCEMENT LIMIT

To protect existing ground water quality and to prevent ground water pollution, the state's ground water standards provide for the establishment of enforcement limits; WAC 173-200. Enforcement limits are determined on a case-by-case basis and are generally established at levels less than the ground water criteria. These limits represent the maximum allowable concentration of a particular substance which can be detected at a specified point of compliance.

For the T-Lake WBZ ground water beneath the western area of the LWC Farm, enforcement limits would be:

Nitrate = 15.8 mg/L
TDS = 420 mg/L

Ecology's ground water guidance defines a violation of an enforcement limit as two consecutive exceedances for the same parameter at the same well. Based on the downgradient data from MW-18 and MW-19 for the T-Lake WBZ beneath the western portion of the LWC Farm fields (Fig. 3), the Lamb-Weston facility would have been in compliance with the nitrate and TDS enforcement limits had these limits been in place during the current permit cycle.

The ground water quality in the downgradient wells relative to the background conditions (Figs. 5 and 6) for the T-Lake WBZ appear to be supported by the water and nitrogen loadings to the fields as reported in the annual farm operations reports. The treatment of the wastewater by the wetlands has resulted in nitrogen load values well below crop requirements. Wastewater hydraulic loads have also been well below crop demands. In addition, nitrate and TDS data from the Farm Drain have been low and less than the ground water criteria; Addendum 1. This drain is from sub-surface laterals beneath fields C4, C5, and C8 (Fig. 3) which are shallow (6-8ft), and therefore would be somewhat representative of water that has percolated beyond the root zone.

Lamb-Weston has implemented an engineered wetland system which has dramatically reduced nitrogen and organic loading to the sprayfields, has added sprayfield acreage that has resulted in reduced nutrient loadings, has provided storage for the winter non-growing season, has continuously monitored flow and nitrogen loading to each sprayfield, and has routinely measured in-situ soil moisture to control irrigation.

Based on the above discussion, it has been decided not to include the enforcement limits for the T-Lake WBZ for this permit cycle. Instead the following will be required in the permit:

1. Continued monitoring of the ground water at the LWC Farm site
2. The soil monitoring plan submitted by Lamb-Weston in 2000 as requested by Ecology will be made part of the new permit.
3. The annual farm operations summary report will be required to contain a continuous 3-year trend analysis of the end-of-cropping year soil profile nitrate concentration for all fields based on the soil testing requirements in the permit.
4. The "Best Management Practices/Pollution Prevention Program" section of the permit will require a stable or declining end-of-cropping soil profile nitrate concentration trend over the three years, and the requirement to adjust irrigation plans in low evapotranspiration periods to minimize percolate loses.
    a. This section will also require that the annual leaching fraction for each field be at or less than the leaching requirement for each field.
5. Lamb-Weston will be required to develop and submit a long-range (10 yr) crop plan for the LWC Farm and Paradise fields to estimate the leaching requirement for each site to control soil salinity, and the estimated net nitrogen load capacity for each sprayfield. (NOTE: Please see Response to Comments for changes to this requirement)
    a. The plan will also include a description of how L-W will leach when it is necessary and how it will protect the ground water.
6. The annual "Cropping Schedule for the Upcoming Year" reporting will require the determination of "the annual total net nitrogen load capacity for the sprayfield system based on the expected cropping."
    a. As part of the "Annual Summary of Farm Operations for the Previous Year", Lamb-Weston will be required to report the actual total annual net nitrogen load and the estimated total annual net nitrogen load capacity.

All of the additional information along with a re-evaluation of the background ground water quality for the T-Lake WBZ will be done for the next permit cycle (2009-2014) to determine if enforcement limits are necessary.

COMPARISON OF LIMITATIONS WITH THE EXISTING PERMIT ISSUED DECEMBER 23, 1998

Table 3: Comparison of Previous and New Limits

Parameter	Existing Limits	Proposed Limits
Average monthly flow	1.8 MGD	1.84 MGD
Gross nitrogen load to the sprayfields	N/A	According to the annual Irrigation and Crop Management Plan

MONITORING REQUIREMENTS

Monitoring, recording, and reporting are specified to verify that the treatment process is functioning correctly, that ground water criteria are not violated, and that effluent limitations are being achieved (WAC 173-216-110).

WASTEWATER MONITORING

The monitoring schedule is detailed in the proposed permit under Condition S2. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring.

PROCESS WASTEWATER MONITORING

The monitoring of the daily flow to the wetland system will be required to determine compliance with average monthly discharge limit of 1.84 MGD. The current permit monitors flow from the clarifier which is believed to be representative of the discharge to the wetland system.

The list of test parameters and frequency of testing in the current permit will be carried over into the proposed permit.

IRRIGATION WASTEWATER MONITORING

This monitoring is intended to track the nutrient and water loading to the sprayfields during the year and to use the information to, in part, develop nutrient and water budgets in the annual irrigation and crop plan. The list of parameters and testing frequency in the previous permit will be carried over into the proposed permit.

GROUND WATER MONITORING

The irrigation of wastewater on the Old Farm fields was stopped in 1996. The water levels in many of the monitoring wells in this area have declined or dried up (MW-10). Except for the average TDS value at MW-1R (510 mg/L), all values for nitrate and TDS at the Old Farm wells (Fig. 3; MW-1R, MW-2, MW-11) are less than the ground water criteria.

It has been decided to remove the ground water monitoring requirements for the Old Farm field wells (MW-1R, MW-2, MW-11) so long as wastewater continues not to be applied to any of these fields.

Ground water sampling will be required at MW-12, -15, -16, -17, -18, and -19. The list of test parameters and sample frequency in the current permit will remain mostly unchanged and extended to the proposed permit: a) "Static water elevation" will replace "static water level"; b) Some cation/anion analysis will be done; there is no information on these parameters for any of the wells.

The permit requirement to monitor the Farm Well will be removed. If this well is used to provide supplemental water to the fields, it is the responsibility of Lamb-Weston to account for the additional nutrient and water loading from this well in the annual report.

In the permit application, Lamb-Weston requested that TKN and ammonia-N be removed from the ground water testing requirements. This request was based on both parameters are poor indicators of the performance of the land treatment system and concentrations of both parameters have been less than or near the lab's test method detection level.

A review of the TKN and ammonia data for the wells (Addendum 1) confirms the consistent low concentrations for all wells. The lower organic concentration of the process wastewater from the wetland treatment, and the low mobility of TKN and ammonia in the soil column lessens the potential for these nitrogen species to leach to the ground water.

It has been decided to grant the request of Lamb-Weston to remove TKN and ammonia-N from the ground water testing requirements.

MUD PIT MONITORING

Enough information for this waste stream has been gathered. This monitoring will be removed from the proposed permit.

FARM DRAIN MONITORING

The list of test parameters and sampling frequency will not be changed from the current permit. This information provides an estimate of soil percolate water quality.

CROP MONITORING

The monitoring requirements for the sprayfield crops in the current permit will be extended into the proposed permit. The results of the monitoring will be reported in the annual Irrigation and Crop Management Plan.

The current permit requires composite samples be collected "..from different irrigation fields." Samples shall be comprised of at least ten (10) random samples from each harvest. The Department has determined that this is a reasonable request for crops such as alfalfa, grass, wheat, mint, and related types for the determination of nutrient uptake and developing nutrient balances.

For crops that are less "grain/grass" type (i.e., non-forage crops) and have a large amount of vegetative growth (e.g., corn, potatoes), the use of a single and established literature value for nutrient uptake for the determination of nutrient uptake, and developing nutrient balances is acceptable.

SOIL MONITORING

Lamb-Weston submitted the following soil monitoring plan in the permit application. It is based on the plan submitted by Lamb-Weston at Ecology's request (CES, 2000b). Some changes have been requested based on their review of the historical soils monitoring data.

1. Soil moisture monitoring: Lamb-Weston has installed a soil moisture monitoring system to manage their irrigation to ensure the leaching fraction is at or less than the leaching requirement. Results of this monitoring will continue to be reported in the annual Farm Operations Summary.

2. Soil chemistry and fertility monitoring: Table A (Addendum 1) shows the proposed soil monitoring for the system.

    a. Fall and Spring sampling for nitrate, ammonia, soluble salts, and soil moisture will continue at one foot depths to five feet, or until auger refusal, for the LWC and Paradise fields. Each depth will be a composite comprised of at least six subsamples.

    The Old Farm fields will be monitored less frequently.

    b. Cation and anion testing in the Fall will be confined to the top foot. A complete soil profile cation/anion testing will be done once during the permit cycle prior to permit renewal; Fall 2008.

    c. It is proposed to eliminate CEC (cation exchange capacity) testing. CEC is dependent on soil organic matter and clay content; both change slowly. There is 10 years of CEC data for the one foot and other depths, and an average value can be used.

    d. It is proposed that TKN testing be limited to only once per permit cycle since ammonia-N is tested at depth twice per year. Ammonia is more readily converted to available nitrogen and can potentially move through the soil column, and the test method for TKN is not sensitive to detect moderate changes in concentrations.

    e. Soils in the Old Farm fields will be monitored only once per year (Fall) since process wastewater has not been applied for several years and will not for the foreseeable future.

    Ecology agrees with the proposed soil monitoring plan submitted by Lamb-Weston (Table A).

OTHER PERMIT CONDITIONS

REPORTING AND RECORDKEEPING

The conditions of S3 are based on the authority to specify any appropriate reporting and recordkeeping requirements to prevent and control waste discharges (WAC 173-216-110).

FACILITY LOADING

The design criteria for this treatment facility are taken from the 1998 engineering report and 2000 O&M manual prepared by The Kirkbride Group and are as follows:

Monthly average flow (max. month):	1.84 MGD
Gross nitrogen load to the sprayfields	According to the annual Irrigation and Crop Plan

The permit requires the Permittee to maintain adequate capacity to treat the flows and waste loading to the treatment plant (WAC 173-216-110[4]). For significant changes in loadings to the treatment works, the permit requires a new application and an engineering report (WAC 173-216-110[5]).

IRRIGATION AND CROP MANAGEMENT PLANS

The irrigation and crop management plan is required to support the engineering report and operations and maintenance manual. This plan shall include a consideration of wastewater application at agronomic rates and should describe and evaluate various irrigation controls.

Additions to the annual report to what is in the current permit include:

1. A continuous 3-year trend analysis of the end-of-cropping year soil profile nitrate concentration at the five foot depth for all sprayfields. The trend will start with the 2002 season.

   (Note: Please see Response to Comments for changes to these additions)

2. The "Cropping Schedule for the Upcoming Year" section of the report will require the determination of the annual total net nitrogen and water load capacity, and FDS loads for the sprayfield system based on the expected cropping.

   a. This section will also require an estimation of the leaching requirement and a description of how the requirement will be met.

OPERATIONS AND MAINTENANCE

The proposed permit contains condition S.5. as authorized under Chapter 173-240-150 WAC and Chapter 173-216-110 WAC. It is included to ensure proper operation and regular maintenance of equipment, and to ensure that adequate safeguards are taken so that constructed facilities are used to their optimum potential in terms of pollutant capture and treatment.

Lamb-Weston submitted an updated O&M manual in 2000.

SOLID WASTE PLAN

Standard permit language will be used that prevents the disposal of any solid waste into surface waters and all solid waste shall be disposed of in accordance with any permit required by the local jurisdictional health department.

SPILL PLAN

Lamb-Weston submitted an updated spill plan in 2003. Standard permit language will be used that requests periodic review of the plan and updates as needed.

GENERAL CONDITIONS

General Conditions are based directly on state laws and regulations and have been standardized for all industrial waste discharge to ground water permits issued by the Department.

Condition G1 requires responsible officials or their designated representatives to sign submittals to the Department. Condition G2 requires the Permittee to allow the Department to access the treatment system, production facility, and records related to the permit. Condition G3 specifies conditions for modifying, suspending or terminating the permit. Condition G4 requires the Permittee to apply to the Department prior to increasing or varying the discharge from the levels stated in the permit application. Condition G5 requires the Permittee to construct, modify, and operate the permitted facility in accordance with approved engineering documents. Condition G6 prohibits the Permittee from using the permit as a basis for violating any laws, statutes or regulations. Conditions G7 and G8 relate to permit renewal and transfer. Condition G9 requires the payment of permit fees. Condition G10 describes the penalties for violating permit conditions.

RECOMMENDATION FOR PERMIT ISSUANCE

This proposed permit meets all statutory requirements for authorizing a wastewater discharge, including those limitations and conditions believed necessary to control toxics, and to protect human health and the beneficial uses of waters of the State of Washington. The Department proposes that the permit be issued for five years.

REFERENCES FOR TEXT AND APPENDICES

CES, 1999a. Engineering Report Addendum for Additional Land Application Fields, Lamb-Weston, Connell, Washington. May

CES, 1999b. Hydrogeologic Report, Lamb-Weston, Connell, Washington. November

CES, 2000a. 1999 Annual Summary of Operations, 2000 Irrigation and Crop Plan, April

CES, 2000b. Lamb-Weston Connell Soils Monitoring Plan. September

CES, 2001. 2000 Farm System Operations Summary, April

CES, 2002. 2001 Farm System Operations Summary, April.

CES, 2003. 2002 Farm System Operations Summary. April

CES, 2004. 2003 Farm System Operations Summary. March

The Kirkbride Group, Inc. 1998. Lamb-Weston, Inc. Connell, Washington, Process Water Treatment System, Engineering Report – Addendum, Phase II System Improvements. August

The Kirkbride Group, 2000. Process Water Treatment System Operations and Maintenance Manual. May

Washington State Department of Ecology, 1993. Guidelines for Preparation of Engineering Reports for Industrial Wastewater Land Application Systems, Ecology Publication # 93-36. 20 pp.

Washington State Department of Ecology.

Laws and Regulations(http://www.ecy.wa.gov/laws-rules/index.html)

Permit and Wastewater Related Information
(http://www.ecy.wa.gov/programs/wq/wastewater/index.html

Washington State Department of Ecology, 1996. Implementation Guidance for the Ground Water Quality Standards, Ecology Publication # 96-02.

APPENDICES

APPENDIX A--PUBLIC INVOLVEMENT INFORMATION

The Department has tentatively determined to reissue a permit to the applicant listed on page 1 of this fact sheet. The permit contains conditions and effluent limitations which are described in the rest of this fact sheet.

Public notice of application was published on June 26, 2003 in the Tri-City Herald to inform the public that an application had been submitted and to invite comment on the reissuance of this permit.

The Department will publish a Public Notice of Draft (PNOD) on (date) in the Tri-City Herald to inform the public that a draft permit and fact sheet are available for review. Interested persons are invited to submit written comments regarding the draft permit. The draft permit, fact sheet, and related documents are available for inspection and copying between the hours of 8:00 a.m. and 5:00 p.m. weekdays, by appointment, at the regional office listed below. Written comments should be mailed to:

Water Quality Permit Coordinator
Department of Ecology
4601 North Monroe Street
Spokane, WA 99205-1295

Any interested party may comment on the draft permit or request a public hearing on this draft permit within the thirty (30) day comment period to the address above. The request for a hearing shall indicate the interest of the party and reasons why the hearing is warranted. The Department will hold a hearing if it determines there is a significant public interest in the draft permit (WAC 173-216-100). Public notice regarding any hearing will be circulated at least thirty (30) days in advance of the hearing. People expressing an interest in this permit will be mailed an individual notice of hearing.

Comments should reference specific text followed by proposed modification or concern when possible. Comments may address technical issues, accuracy and completeness of information, the scope of the facility's proposed coverage, adequacy of environmental protection, permit conditions, or any other concern that would result from issuance of this permit.

The Department will consider all comments received within thirty (30) days from the date of public notice of draft indicated above, in formulating a final determination to issue, revise, or deny the permit. The Department's response to all significant comments is available upon request and will be mailed directly to people expressing an interest in this permit.

Further information may be obtained from the Department by telephone, 509-329-3524, or by writing to the address listed above.

The Fact Sheet and permit were written by Don Nichols

APPENDIX B--GLOSSARY

Average Monthly Discharge Limitation--The average of the measured values obtained over a calendar month's time.

Best Management Practices (BMPs)--Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the State. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD_5--Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD_5 is used in modeling to measure the reduction of dissolved oxygen in a receiving water after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass--The intentional diversion of waste streams from any portion of the collection or treatment facility.

Composite Sample--A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite"(collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots.

Continuous Monitoring –Uninterrupted, unless otherwise noted in the permit.

Distribution Uniformity--The uniformity of infiltration (or application in the case of sprinkle or trickle irrigation) throughout the field expressed as a percent relating to the average depth infiltrated in the lowest one-quarter of the area to the average depth of water infiltrated.

Engineering Report--A document, signed by a professional licensed engineer, which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report shall contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Grab Sample--A single sample or measurement taken at a specific time or over as short period of time as is feasible.

Industrial Wastewater--Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business, from the development of any natural resource, or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

pH--The pH of a liquid measures its acidity or alkalinity. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

Soil Scientist--An individual who is registered as a Certified or Registered Professional Soil Scientist or as a Certified Professional Soil Specialist by the American Registry of Certified Professionals in Agronomy, Crops, and Soils or by the National Society of Consulting Scientists or who has the credentials for membership. Minimum requirements for eligibility are: possession of a baccalaureate, masters, or doctorate degree from a U.S. or Canadian institution with a minimum of 30 semester hours or 45 quarter hours professional core courses in agronomy, crops or soils, and have 5,3,or 1 years, respectively, of professional experience working in the area of agronomy, crops, or soils.

State Waters--Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

Technology-based Effluent Limit--A permit limit that is based on the ability of a treatment method to reduce the pollutant.

Total Dissolved Solids--That portion of total solids in water or wastewater that passes through a specific filter.

Water Quality-based Effluent Limit--A limit on the concentration of an effluent parameter that is intended to prevent pollution of the receiving water.

APPENDIX C--TECHNICAL CALCULATIONS

The following technical information is attached:

1. Outlier analysis, seasonality, Sen's slope estimator, and parametric intra-well tolerance limit for nitrate at MW-12
    a. Outliers included the values for March and November 2002, which were removed
    b. There was a significant increasing trend in the data (n=58; 95% C.I.). No significant trend was found for the data period June 2001 – December 2003; n = 29.
2. Outlier analysis, seasonality, Sen's slope estimator, and parametric intra-well tolerance limit for TDS at MW-12
    a. There were no outliers; the data was neither normally or log-normally distributed

APPENDIX D--RESPONSE TO COMMENTS

Comments were received from Lamb-Weston on the draft permit during the public comment period. Those comments and Ecology's responses are attached.

Also received, in a letter dated November 15, 2004, was a request to change the name of the facility from Lamb-Weston, Inc., to ConAgra Foods Packaged Foods Company, Inc. This became effective on September 26, 2004. There are no personnel changes and the facility will continue to do business under Lamb-Weston.

Therefore, the face page of the permit will be changed to read:

ConAgra Foods Packaged Foods Company, Inc.
d/b/a Lamb-Weston
811 Gum Street
Connell, WA 99326

The cover page and the General Information section of the Fact Sheet will also be changed.

COMMENTS TO SWDP 5328, Lamb-Weston Connell	RESPONSES

Natural Solutions for Water

Using natural systems to take the waste out of water

Phone: 509-921-0290 Fax: 509-921-1788
12720 E Nora, Suite A Spokane, WA 99216

October 18, 2004

Mr. Don Nichols
Washington Dept. of Ecology
4601 N. Monroe
Spokane, WA 99205-1295

SUBJECT: Comments on Draft State Waste Discharge Permit No. ST 5328

Dear Don,

Cascade Earth Sciences is pleased to submit the attached comments on behalf of Lamb-Weston, Connell (LWC) following review of the Draft State Waste Discharge Permit No. ST 5328. There are several errors that need to be corrected in the fact sheet. It also appears that Special Condition S.9. creates duplication in the reporting requirements. The comments are listed below.

FACT SHEET

Page 9, Under LWC Farm, 2nd paragraph.

1) January 1999 should be changed to January 2000 since the first data points to compare ground water elevation at MW12 and determine ground water flow came from MW18 and 19 in Jan 2000.

2) MW-17 should be MW-18. MW-17 is dry.

3) The groundwater elevations shown in the recent fact sheet do not match the values we submitted in our August Factual Comments letter. It may be that Ecology used a different date range to calculate mean elevation, but we should make sure that LWC and Ecology are working from the same data. In reviewing the data, it appears that there may be a difference in date ranges between Ecology and LWC. The elevation values computed by LWC are based on the range of January 2000 through June 2004. The Fact Sheet cites 1999 as the starting point for the data range but the end point is not stated and MW-18 and MW-19 weren't installed until January 2000. Please review the source of Ecology's groundwater elevations to make sure they derived from an accurate and consistent range of dates.

Monitoring Well	Draft Fact Sheet	LWC Comments
MW-12	962.39	962.74
MW-18	954.76	953.99
MW-19	954.08	954.19

Fact Sheet

Response #1: Noted and changed in the Fact Sheet narrative

Response #2: Noted and changed in the Fact Sheet narrative

Response #3: The Fact Sheet narrative has been edited to show that the average well elevations are for the period January 2000 through December 2003.

COMMENTS TO SWDP 5328, Lamb-Weston Connell	RESPONSES

Page 13, Wanapum IFZ and Paradise Fields, 2nd paragraph, Item #1.

In deleting the verbiage as requested in our August Factual Comment letter, Ecology inadvertently deleted the word " inches" following the number 60. In addition, we can only monitor soil moisture to auger refusal. The revised added wording "...inches or auger refusal" is needed.

PERMIT

Page 19 of 22, S9 Compliance Schedule.

The requested 10-yr crop plan requires water balances and nitrogen load capacities for both farms (LWC and Paradise). However, each year Lamb-Weston provides a cropping plan containing projected water balances and nutrient balances and site capacities in the Irrigation and Crop Management Plan as required under Special Condition S.8. Actual previous year system performance is reported as required under Special Condition S.8 in the Annual Summary of Farm Operations each year and the following year's cropping plan provides a more representative view of the site capacities and nutrient balances than a 10-year plan could provide. Therefore, Special Condition S.9. should be removed from the permit because it is a duplication of the effort required in Special Condition S.8. and provides less representative data than already requested by Ecology and provided by Lamb-Weston.

Thank you for your consideration of the comments described above. If you have any questions or concerns regarding the LWC's comments, please feel free to call me at 509-921-0290 or Mike DeWulf at Lamb-Weston Connell at 509-234-5511.

Sincerely,

CASCADE EARTH SCIENCES

For:
Steve Venner
Senior Soil Scientist

6SLV/sjr

c: Mike DeWulf - Lamb-Weston, Connell
Larry Smith - Lamb-Weston, Connell
Dave Larson - Lamb-Weston, Connell
Mike Henderson - Lamb-Weston, Corporate
Project File 2321024
Doc: Draft Permit Comments 10-18-04.doc

Comment: Add wording, "..inches or auger refusal."

Response: Noted; the Fact Sheet will be edited to show the language that was inadvertently deleted.

PERMIT

Comment: Remove Special Condition S9 because it is duplicative of what is already required in Section S8.

Response: After reviewing what is required in Section S8.B and what was requested in 10-year plan in Section S9, there is some duplication in the requirements. The information presented by Section S8.B will give a better estimation of the nitrogen, water and FDS load capacities, and leaching requirement for the proposed crops at the LWC and Paradise fields, than trying to estimate these values for a speculated crop sequence over a 10-year period.

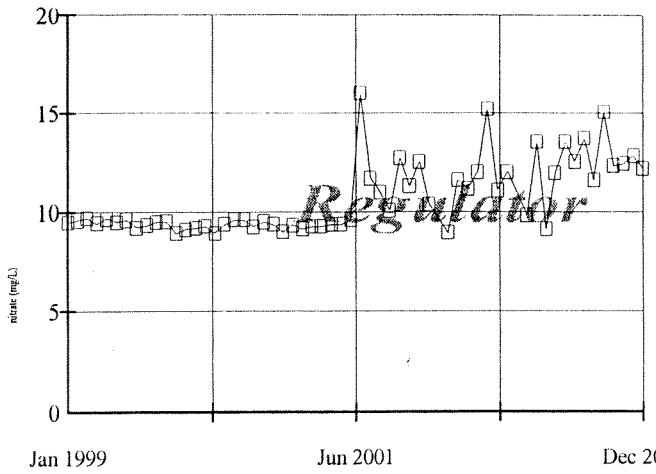
Ecology agrees with the comment to eliminate Section S9 and the 10-year plan. However, the portion of Section S9 that required a comparison of actual nitrogen loads and leaching to estimated values shall be retained. The following language will be added to Section S8.A:

7. Comparison of actual vs. estimated. The total net nitrogen, water, and FDS loads and leaching fractions for the LWC and Paradise sites shall be compared to the estimated values presented in the previous years Irrigation and Crop Plan.

NITRATE

v.8.5.09. For regulatory purposes only. CAS# n/a EPA m.a. 0.05

OUTLIER ANALYSIS
MW-12



Log-transformed:
Mean = 2.357.
Std. Dev. = 0.156.
Critical Tn = 3.013.

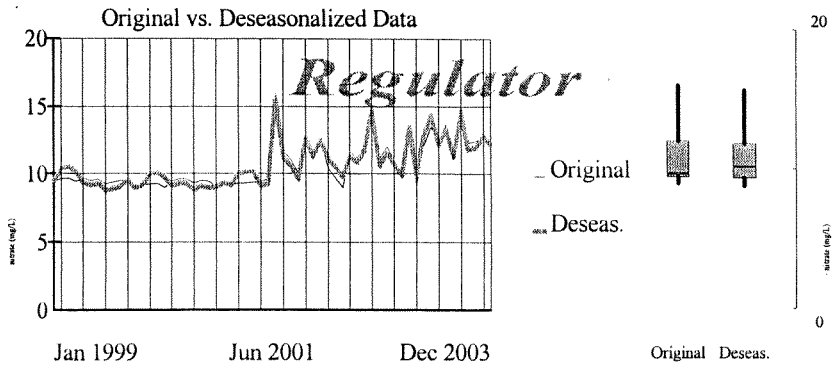
No statistical outliers are present.
Data were found to be neither normally nor log-normally distributed; user chose to continue.
Normality test used: Shapiro Francia.
W Statistic = 0.8471
W Quantile = 0.9615

Constituent: nitrate (mg/L) Facility: Landfill X Data File: T-Lake
Date: 9/10/04, 11:55 AM Client: Regulatory Use View: T-Lake

v.8.5.09. For regulatory purposes only. CAS# n/a EPA m.a. 0.05

SEASONALITY: MW-12

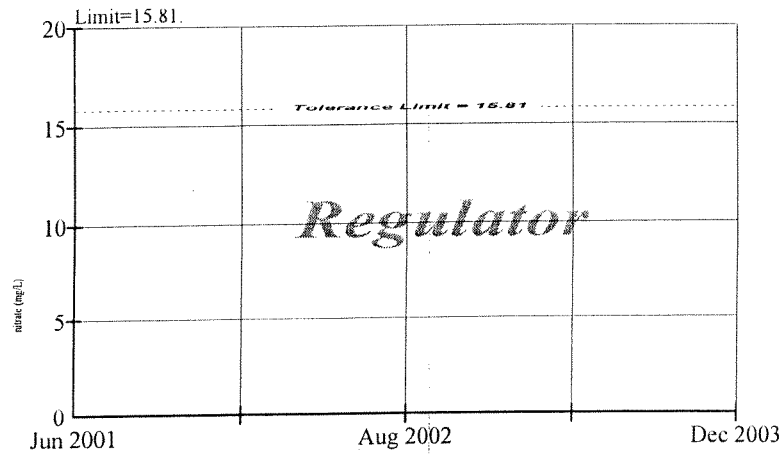
For the data shown, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 6.908
Tabulated Chi-Squared value = 7.815 with 3 degrees of freedom at the 5% significance level.
There were 7 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 6.906
Adjusted Kruskal-Wallis statistic (H') = 6.908



Constituent: nitrate (mg/L) Facility: Landfill X Data File: T-Lake
Date: 9/10/04, 11:55 AM Client: Regulatory Use View: T-Lake

v.8.5.09. For regulatory purposes only. CAS# n/a EPA m.a. 0.05

PARAMETRIC INTRA-WELL TOLERANCE LIMIT
MW-12

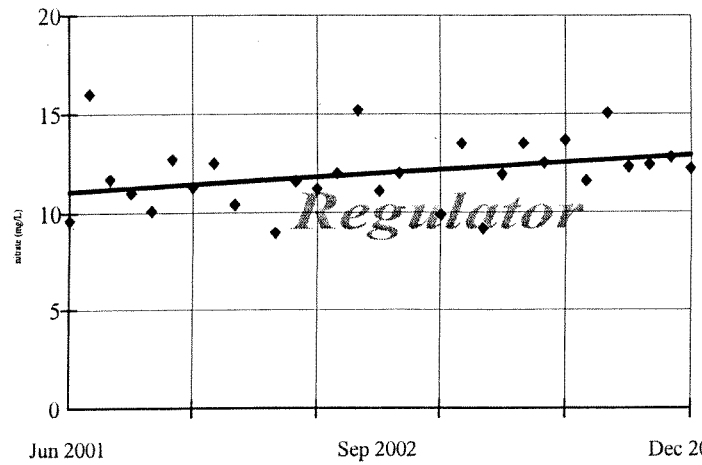


95% coverage. Background Data Summary: Mean=12, Std. Dev=1.707, 0% nds, 29 obs. Normality test used: Shapiro Wilk. W S for background data = 0.9676, W Quantile = 0.926. Testwise alpha = 0.05.

Constituent: nitrate (mg/L) Facility: Landfill X Data File: T-Lake
Date: 9/10/04, 11:56 AM Client: Regulatory Use View: T-Lake

v.8.5.09. For regulatory purposes only. CAS# n/a EPA m.a. 0.05

SEN'S SLOPE ESTIMATOR
MW-12



n = 29.

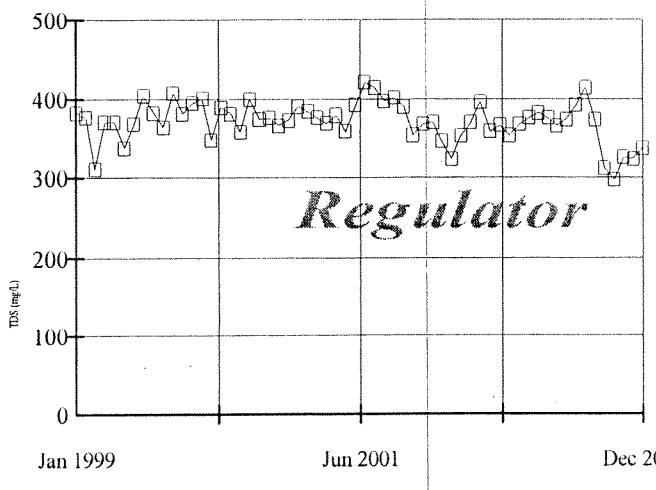
Slope = 0.72 units per year.

Mann Kendall statistic = 97.

Trend not significant at 95% confidence level (two tailed). Critical value = 106.

Constituent: nitrate (mg/L) Facility: Landfill X Data File: T-Lake
Date: 9/10/04, 11:57 AM Client: Regulatory Use View: T-Lake

OUTLIER ANALYSIS
MW-12



Log-transformed:
Mean = 5.914.
Std. Dev. = 0.07182.
Critical Tn = 3.025.

No statistical outliers are present.
Data were found to be neither normally nor log-normally distributed; user chose to continue.
Normality test used: Shapiro Francia.
W Statistic = 0.9295
W Quantile = 0.9625

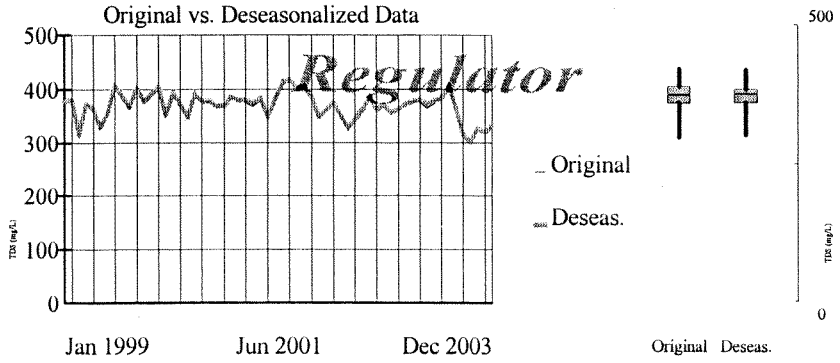
User Comment: TDS

Constituent: TDS (mg/L) Facility: Landfill X Data File: T-Lake
Date: 9/10/04, 12:01 PM Client: Regulatory Use View: T-Lake

v.8.5.09. For regulatory purposes only. CAS# n/a EPA m.a. 0.05

SEASONALITY: MW-12

For the data shown, the Kruskal-Wallis test indicates NO SEASONALITY at the 5% significance level. Because the calculated Kruskal-statistic is less than or equal to the Chi-squared value, we conclude that no season has a significantly different median concentration of this constituent than any other season.
Calculated Kruskal-Wallis statistic = 2.212
Tabulated Chi-Squared value = 7.815 with 3 degrees of freedom at the 5% significance level.
There were 15 groups of ties in the data, consequently the Kruskal-Wallis statistic (H) was adjusted. The adjusted statistic (H') was utilized to determine if the medians were equal.
Kruskal-Wallis statistic (H) = 2.210
Adjusted Kruskal-Wallis statistic (H') = 2.212

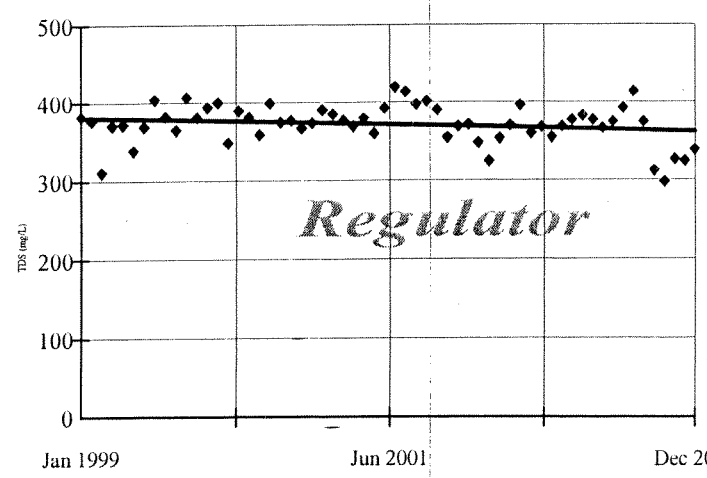


User Comment: TDS

Constituent: TDS (mg/L) Facility: Landfill X Data File: T-Lake
Date: 9/10/04, 12:01 PM Client: Regulatory Use View: T-Lake

v.8.5.09. For regulatory purposes only. CAS# n/a EPA m.a. 0.05

SEN'S SLOPE ESTIMATOR
MW-12



n = 60.

Slope = -4.008 units per year.

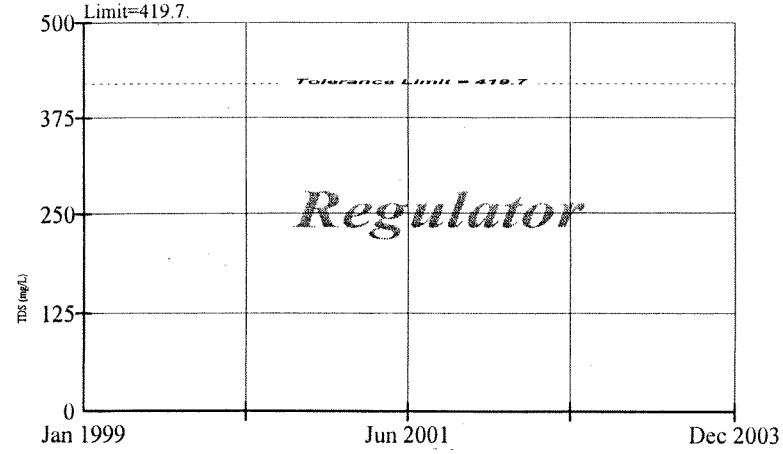
Mann Kendall normal approx. = -1.819.

Trend not significant at 95% confidence level (two tailed).
Critical value = -1.96.

User Comment: TDS

Constituent: TDS (mg/L) Facility: Landfill X Data File: T-Lake
Date: 9/10/04, 12:04 PM Client: Regulatory Use View: T-Lake

PARAMETRIC INTRA-WELL TOLERANCE LIMIT
MW-12



95% coverage. Background Data Summary: (based on square(x) transformed data) Mean=138371, Std. Dev=18724, 0% nds, 60 ol
Normality test used: Shapiro-Francia. W Statistic for background data = 0.9656, W Quantile = 0.9625. Testwise alpha = 0.05.

User Comment: TDS

Constituent: TDS (mg/L) Facility: Landfill X Data File: T-Lake
Date: 9/10/04, 12:04 PM Client: Regulatory Use View: T-Lake

APPENDIX D--RESPONSE TO COMMENTS

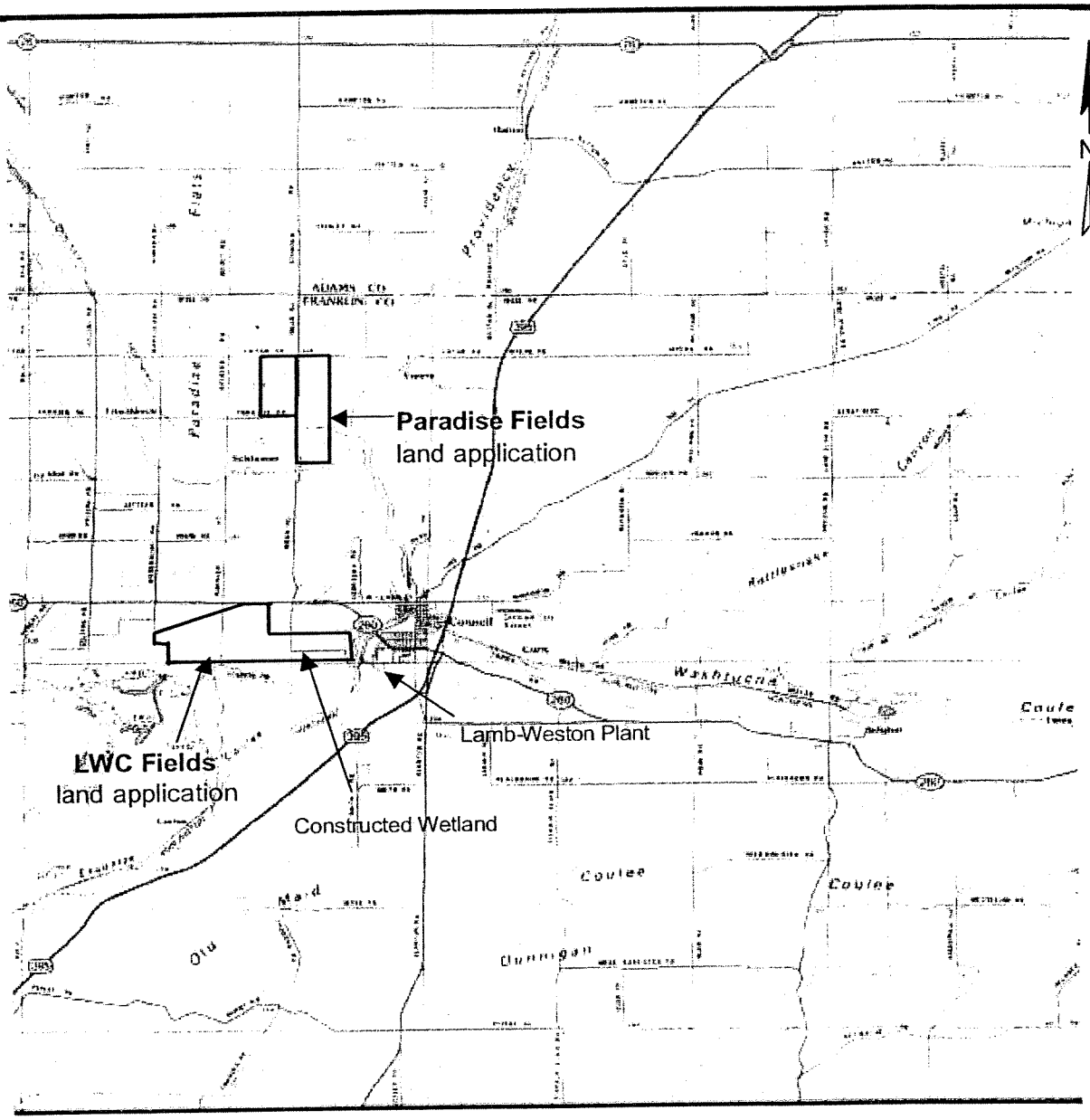
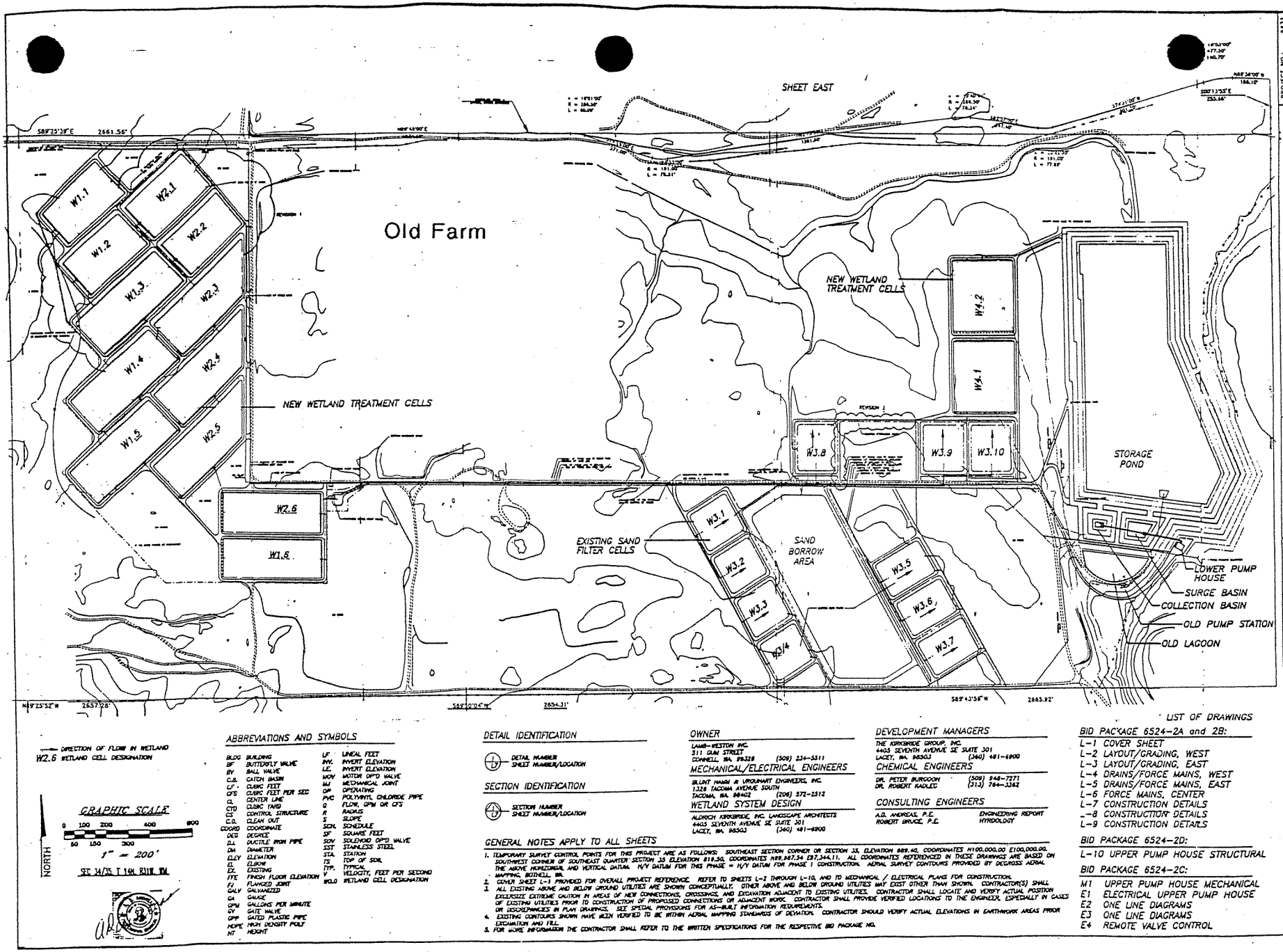


Figure 1. Site Location

(NOT TO SCALE)

(LOCATIONS ARE APPROXIMATE)

(SOURCE: Washington Atlas and Gazetteer, DeLorme Mapping Co., Freeport, ME, 1992)



DIRECTION OF FLOW IN WETLAND
W2.6 WETLAND CELL DESIGNATION

ABBREVIATIONS AND SYMBOLS

BLDG	BUILDING	LF	LINEAL FEET
BF	BUTTERFLY VALVE	INV.	INVERT ELEVATION
BV	BALL VALVE	LE	INVERT ELEVATION
C.B.	CATCH BASIN	MOV	MOTOR OP'D VALVE
C.F.	CUBIC FEET	MJ	MECHANICAL JOINT
CFS	CUBIC FEET PER SEC	OP	OPERATING
℄	CENTER LINE	PVC	POLYVINYL CHLORIDE PIPE
CY	CUBIC YARD	Q	FLOW, GPM OR CFS
CONST	CONTROL STRUCTURE	R	RADIUS
CO	CLEAN OUT	S	SLOPE
C.O.	COORDINATE	SCH.	SCHEDULE
COORD	COORDINATE	SF	SQUARE FEET
DEG	DEGREE	SOV	SOLENOID OP'D VALVE
DI	DUCTILE IRON PIPE	SST	STAINLESS STEEL
DIA	DIAMETER	STA.	STATION
ELEV	ELEVATION	TS	TOP OF SOIL
EL	ELBOW	TYP.	TYPICAL
EX	EXISTING	V	VELOCITY, FEET PER SECOND
FFE	FINISH FLOOR ELEVATION	WCD	WETLAND CELL DESIGNATION
FJ	FLANGED JOINT		
GALV	GALVANIZED		
GA	GAUGE		
GPM	GALLONS PER MINUTE		
GV	GATE VALVE		
GPP	GATED PLASTIC PIPE		
HDPE	HIGH DENSITY POLY		
HT	HEIGHT		

DETAIL IDENTIFICATION

DETAIL NUMBER
SHEET NUMBER/LOCATION

SECTION IDENTIFICATION

SECTION NUMBER
SHEET NUMBER/LOCATION

GENERAL NOTES APPLY TO ALL SHEETS

1. TEMPORARY SURVEY CONTROL POINTS FOR THIS PROJECT ARE AS FOLLOWS: SOUTHEAST SECTION CORNER OR SECTION 35, ELEVATION 689.40, COORDINATES N100,000.00 E100,000.00. SOUTHWEST CORNER OF SOUTHEAST QUARTER SECTION 35 ELEVATION 819.50, COORDINATES N98,847.54 E97,344.11. ALL COORDINATES REFERENCED IN THESE DRAWINGS ARE BASED ON THE ABOVE HORIZONTAL AND VERTICAL DATUM. H/V DATUM FOR THIS PHASE = H/V DATUM FOR PHASE 1 CONSTRUCTION. AERIAL SURVEY CONTOURS PROVIDED BY DELMOSS AERIAL MAPPING, BOTHELL, WA.
2. COVER SHEET L-1 PROVIDED FOR OVERALL PROJECT REFERENCE. REFER TO SHEETS L-2 THROUGH L-10, AND TO MECHANICAL / ELECTRICAL PLANS FOR CONSTRUCTION.
3. ALL EXISTING ABOVE AND BELOW GROUND UTILITIES ARE SHOWN CONCEPTUALLY. OTHER ABOVE AND BELOW GROUND UTILITIES MAY EXIST OTHER THAN SHOWN. CONTRACTOR(S) SHALL EXERCISE EXTREME CAUTION IN AREAS OF NEW CONNECTIONS, CROSSINGS, AND EXCAVATION ADJACENT TO EXISTING UTILITIES. CONTRACTOR SHALL LOCATE AND VERIFY ACTUAL POSITION OF EXISTING UTILITIES PRIOR TO CONSTRUCTION OF PROPOSED CONNECTIONS OR ADJACENT WORK. CONTRACTOR SHALL PROVIDE VERIFIED LOCATIONS TO THE ENGINEER, ESPECIALLY IN CASES OF DISCREPANCIES IN PLAN DRAWINGS. SEE SPECIAL PROVISIONS FOR AS-BUILT INFORMATION REQUIREMENTS.
4. EXISTING CONTOURS SHOWN HAVE BEEN VERIFIED TO BE WITHIN AERIAL MAPPING STANDARDS OF DEVIATION. CONTRACTOR SHOULD VERIFY ACTUAL ELEVATIONS IN EARTHWORK AREAS PRIOR EXCAVATION AND FILL.
5. FOR MORE INFORMATION THE CONTRACTOR SHALL REFER TO THE WRITTEN SPECIFICATIONS FOR THE RESPECTIVE BID PACKAGE NO.

OWNER

LAMB-WESTON INC.
511 GUM STREET
CONNELL, WA. 99326 (509) 234-5511

MECHANICAL/ELECTRICAL ENGINEERS

BLUNT HANN & URQUHART ENGINEERS, INC.
1328 TACOMA AVENUE SOUTH
TACOMA, WA. 98402 (206) 572-2312

WETLAND SYSTEM DESIGN

ALDRICH KIRKBRIDE, INC. LANDSCAPE ARCHITECTS
4405 SEVENTH AVENUE SE SUITE 301
LACEY, WA. 98503 (360) 491-6900

DEVELOPMENT MANAGERS

THE KIRKBRIDE GROUP, INC.
4405 SEVENTH AVENUE SE SUITE 301
LACEY, WA. 98503 (360) 491-6900

CHEMICAL ENGINEERS

DR. PETER BURGOON (509) 948-7271
DR. ROBERT KADLEC (313) 764-3342

CONSULTING ENGINEERS

A.D. ANDREAS, P.E. ENGINEERING REPORT
ROBERT BRUCE, P.E. HYDROLOGY

LIST OF DRAWINGS

BID PACKAGE 6524-2A and 2B:

L-1 COVER SHEET
L-2 LAYOUT/GRADING, WEST
L-3 LAYOUT/GRADING, EAST
L-4 DRAINS/FORCE MAINS, WEST
L-5 DRAINS/FORCE MAINS, EAST
L-6 FORCE MAINS, CENTER
L-7 CONSTRUCTION DETAILS
L-8 CONSTRUCTION DETAILS
L-9 CONSTRUCTION DETAILS

BID PACKAGE 6524-2D:

L-10 UPPER PUMP HOUSE STRUCTURAL

BID PACKAGE 6524-2C:

M1 UPPER PUMP HOUSE MECHANICAL
E1 ELECTRICAL UPPER PUMP HOUSE
E2 ONE LINE DIAGRAMS
E3 ONE LINE DIAGRAMS
E4 REMOTE VALVE CONTROL

PROJECT NO.: 6431
DESIGNED BY: ALDRICH
DRAWN BY: ALDRICH
CHECKED BY: KIRKBRIDE
DATE: APR. 12, 1995

COVER SHEET

PROCESS WATER LAND TREATMENT AND SYSTEM IMPROVEMENTS-PHASE 2-WETLAND PRETREATMENT

LAMB-WESTON, INC.
BID PACKAGE NO. 6524-2A
511 GUM STREET
CONNELL, WA. 99326

NO.	DATE	REVISION
2	8-5	DELETE GRAVITY DRAIN, REVISE CONNECTION

ALDRICH KIRKBRIDE II
landscape architects
4405 seventh avenue se

SHEET: L-1
PROJ. NO.: 94
DWG: PH2L1.1

Fig 2. Constructed wetlands

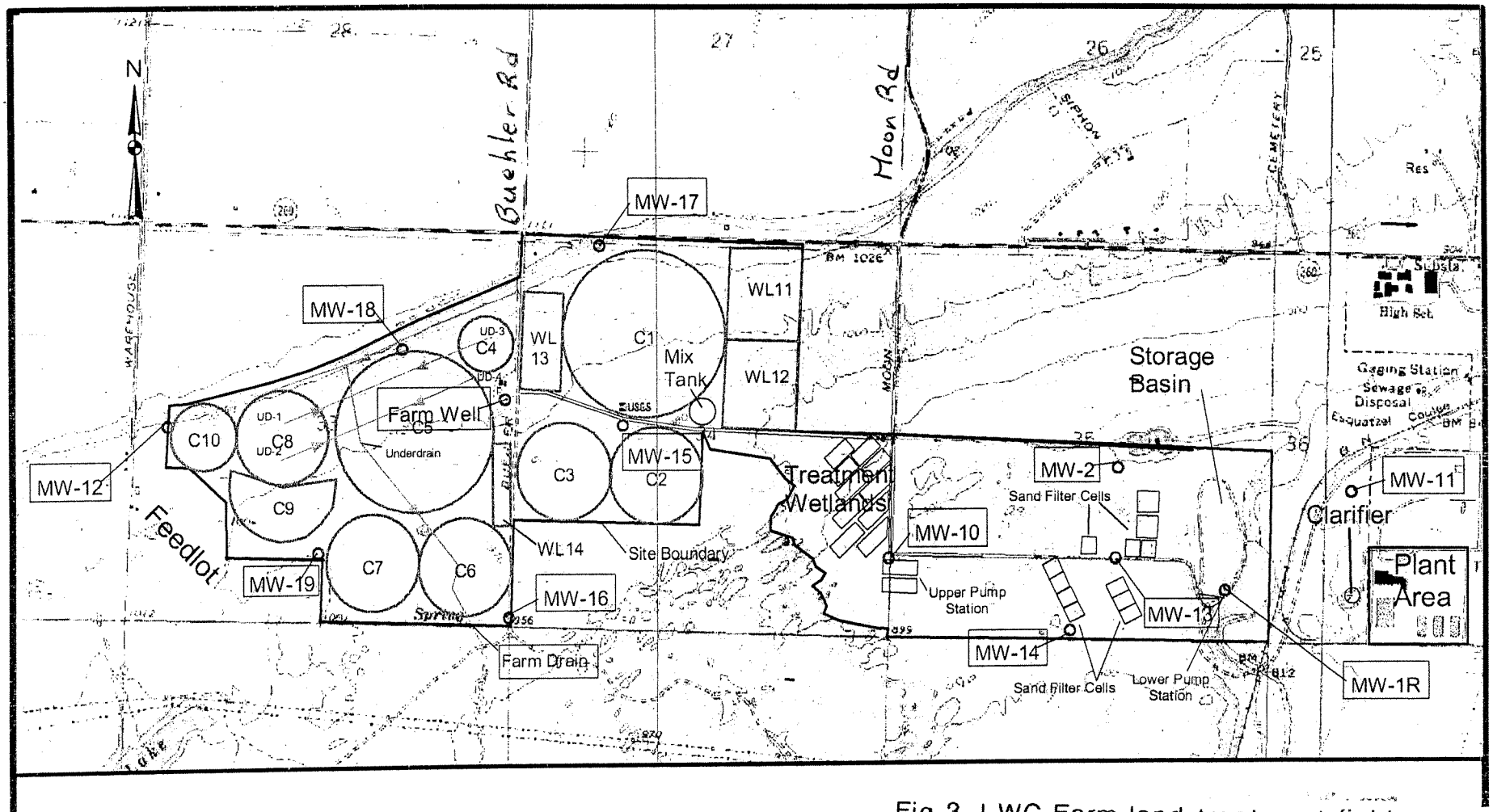


Fig 3. LWC Farm land treatment fields

Base map is a digital raster graphic of 1:24000 scale topographic maps published in 1980 by the U.S. Geological Survey. Downloaded from http://www.terraserver-usa.com

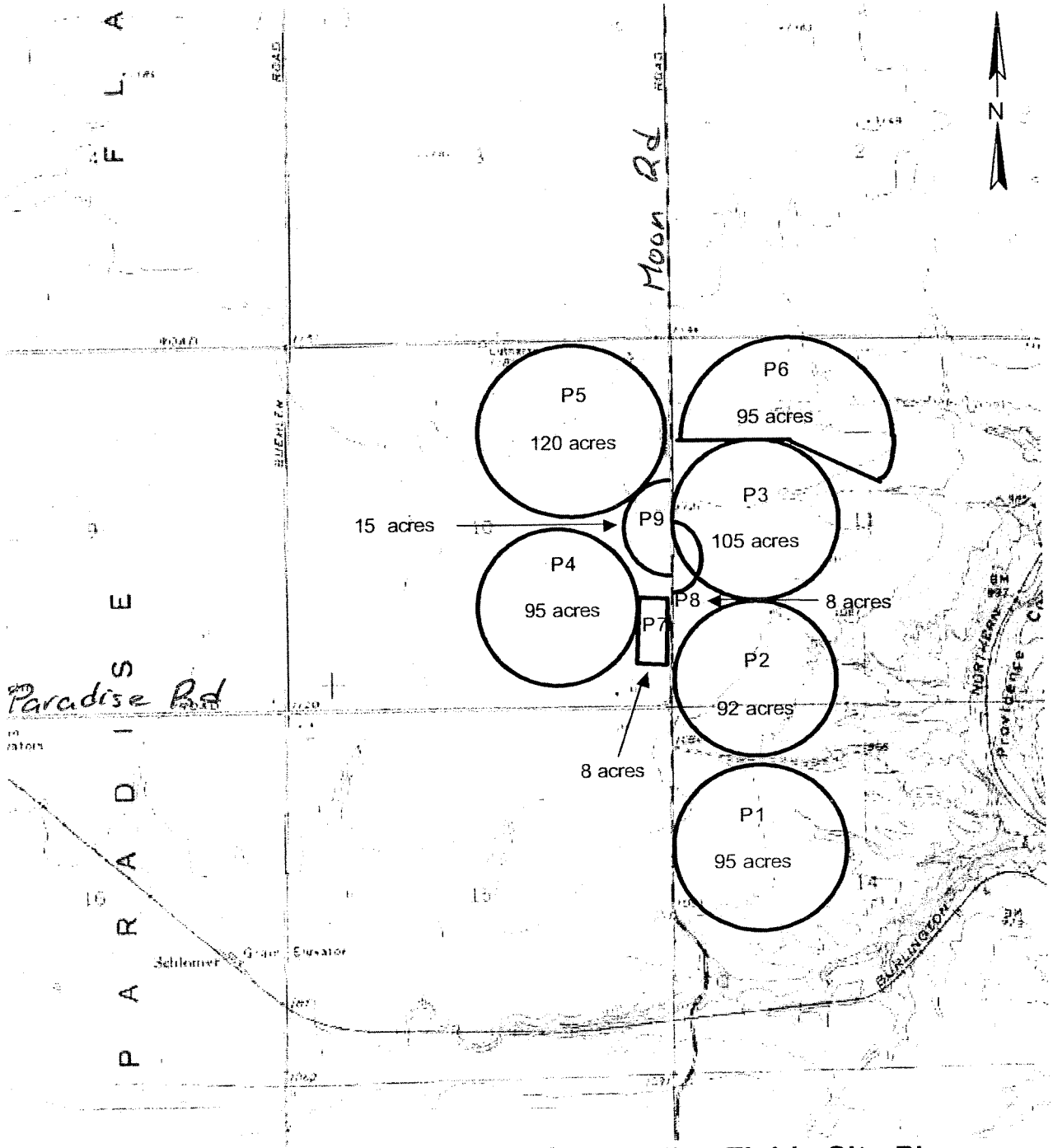


Figure 4. Paradise Fields Site Plan

(NOT TO SCALE)

(LOCATIONS ARE APPROXIMATE)

(SOURCE: USGS 7.5' Topographic map
Frischkneckt, WA)

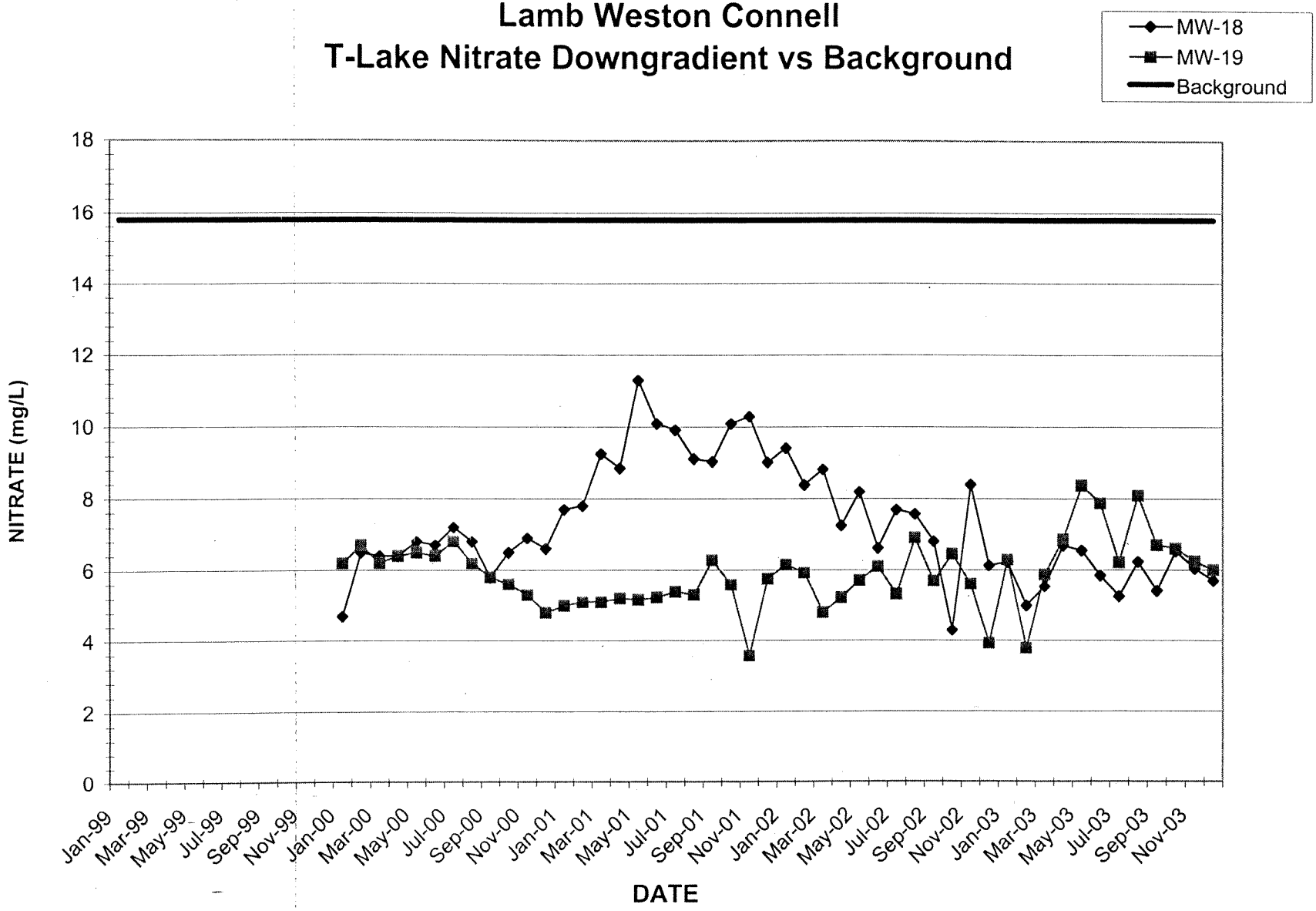

Lamb Weston Connell
T-Lake Nitrate Downgradient vs Background
MW-18
MW-19
Background
NITRATE (mg/L)
0
2
4
6
8
10
12
14
16
18
Jan-99
Mar-99
May-99
Jul-99
Sep-99
Nov-99
Jan-00
Mar-00
May-00
Jul-00
Sep-00
Nov-00
Jan-01
Mar-01
May-01
Jul-01
Sep-01
Nov-01
Jan-02
Mar-02
May-02
Jul-02
Sep-02
Nov-02
Jan-03
Mar-03
May-03
Jul-03
Sep-03
Nov-03
DATE

Fig. 5.

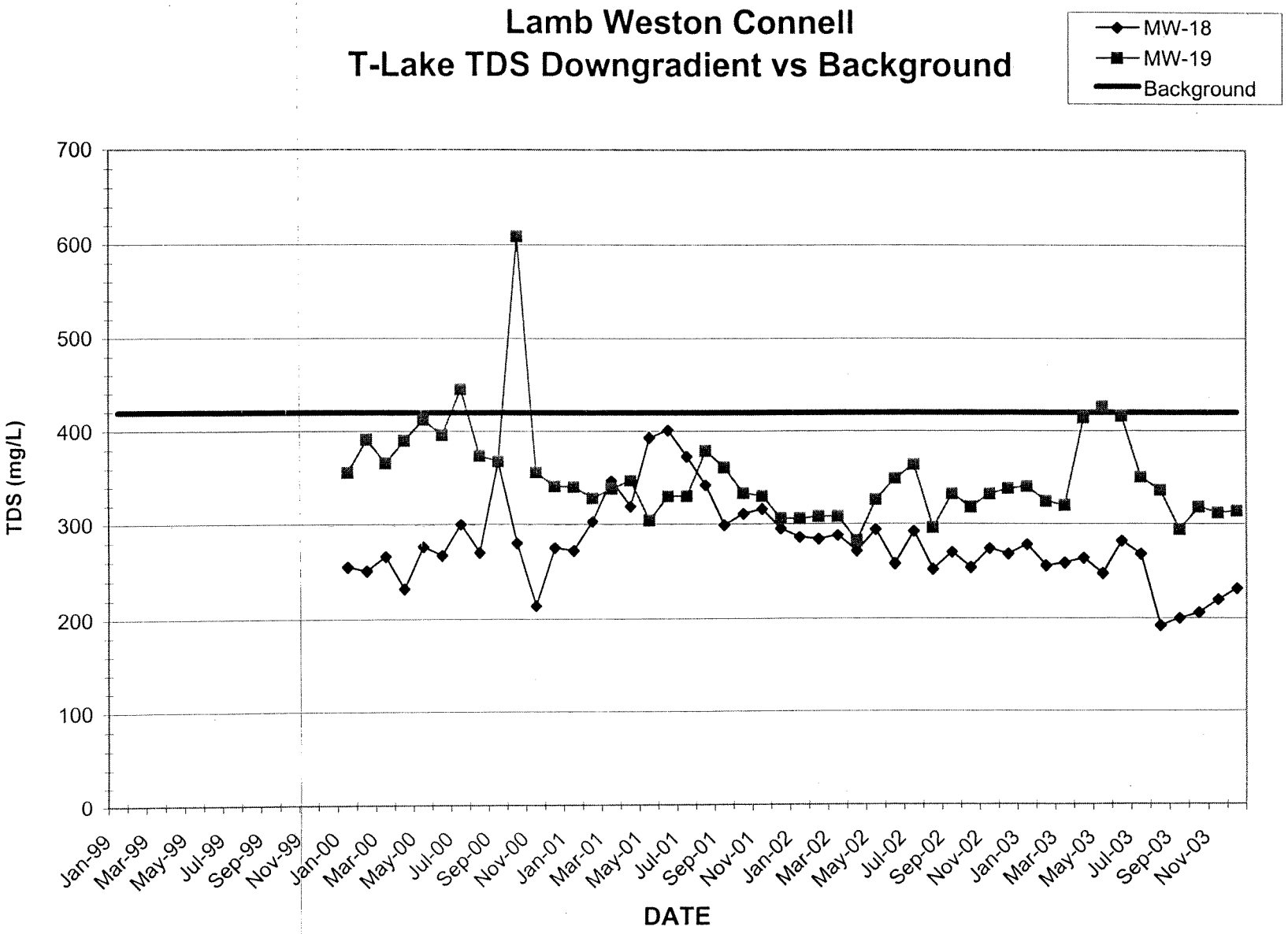

Lamb Weston Connell
T-Lake TDS Downgradient vs Background
MW-18
MW-19
Background
TDS (mg/L)
700
600
500
400
300
200
100
0
Jan-99
Mar-99
May-99
Jul-99
Sep-99
Nov-99
Jan-00
Mar-00
May-00
Jul-00
Sep-00
Nov-00
Jan-01
Mar-01
May-01
Jul-01
Sep-01
Nov-01
Jan-02
Mar-02
May-02
Jul-02
Sep-02
Nov-02
Jan-03
Mar-03
May-03
Jul-03
Sep-03
Nov-03
DATE

Fig. 6.

ADDENDUM 1

Lamb Weston New Farm

Wanapum Interflow Zone

	MW15		MW15		MW15		MW15		MW15		MW15		MW15		MW15		MW15	
	TKN (as N)		NH3 (as N)		NO3 (as N)		CONDUC		TDS		CHLORIDE		pH		DEPTH		TEMP	
DATE	mg/L	QL	mg/L	QL	mg/L	QL	umhos/cm	QL	mg/L	QL	mg/L	QL	s.u.	QL	feet	QL	VAL	QL
Jan-99	0.2		0.1	F	8.53		449		275		36.9		7.94		143.3		60.8	
Feb-99	0.2		0.1	F	8.41		440		326		36.2		7.7		144.7		60.4	
Mar-99	0.1		0.1	F	8.97		466		291		37.9		7.9		143.75		60.8	
Apr-99	0.2		0.1	F	8.7		427		320		37.8		8.5		144.35		62	
May-99	0.2		0.1	F	8.64		447		288		36.4		8.9		144.16		61.9	
Jun-99	0.2		0.1	F	8.57		442		277		32.3		8.8		144.4		66	
Jul-99	0.1	F	0.1	F	8.63		467		275		36.2		7.1		146		68	
Aug-99	0.2		0.1	F	8.49		458		368		35.8		8.2		146.2		63.5	
Sep-99	0.3		0.1	F	8.75		403		232		36.4		8.3		146.6		65.5	
Oct-99	0.1	F	0.1	F	8.78		412		324		36.8		8.5		147.1		61	
Nov-99	0.2		0.1	F	8.7		433		306		38.9		8.3		146.75		58	
Dec-99	0.2		0.78		8.71		409		320		36.3		8.4		147		55	
Jan-00	0.4		0.1	F	8.54		379		334		47.3		8.32		146.74		56	
Feb-00	0.2		0.1	F	8.6		392		292		35.8		8.25		145.15		59	
Mar-00	0.2		0.1	F	8.53		417		283		36.1		8.45		145.8		58.75	
Apr-00	0.2		0.1	F	8.4		389		315		36.8		8.3		145.8		63.4	
May-00	0.2		0.1	F	8.52		399		298		35.9		8.25		145.41		61.6	
Jun-00	0.2		0.1	F	8.99		392		299		39.4		7.97		145.98		63.2	
Jul-00	0.2		0.1	F	8.74		434		308		37.6		8.15		145.82		63.7	
Aug-00	0.1		0.1	F	8.44		453		291		47		8.37		145.91		66.7	
Sep-00	0.2		0.1	F	8.33		464		318		36.9		7.67		145.8		62.8	
Oct-00	0.2		0.1	F	8.63		441		283		37.1		8.32		145.95		62.5	
Nov-00	0.3		0.1	F	8.49		435		285		35.9		8.3		146.14		58.7	
Dec-00	0.3		0.1	F	8.73		443		293		37.5		7.75		146		53.7	
Jan-01	0.2		0.1	F	8.54		406		279		36.7		8.1		146.29		58.5	
Feb-01	0.4		0.2		8.43		418		343		35.9		8.45		146.8		58.1	
Mar-01	0.6		0.1	F	8.38		456		299		35.6		8.65		146.53		62.5	
Apr-01	0.2		0.1	F	8.75		439		298		36.1		8.2		146.85		60.3	
May-01	0.1		0.1	F	8.69		472		323		36.6		8.4		146.85		66.2	
Jun-01	0.4		0.1	F	8.49		481		303		33.8		8.38		146.86		67.3	
Jul-01	1.9	F	0.84	F	8.86		461		335		35.74		8.48		146.71		63.6	
Aug-01	1.9	F		B	8.98		437		324		36.2		8.7		146.82		64.7	
Sep-01	1.9	F	0.84	F	9.68		462		328		36.7		9		146.83		63.5	
Oct-01	1.9	F		B	9.75		456		302		36		7.95		146.76		58.1	
Nov-01	1.9	F	0.84	F	10.6		477		309		37.5		8.16		146.98		57.7	
Dec-01	1.9	F	0.84	F	11.5		458		273		36.7		8.14		146.77		55.2	
Jan-02	1.9	F	0.84	F	11.5		448		299		36.7		8.21		147.4		57.7	
Feb-02	1.9	F	0.84	F	9.87		467		313		39.7		8.35		147.9		56.5	
Mar-02	1.9	F	0.84	F	10.8		466		275		35.7		8.6		147.15		56.1	
Apr-02	1.9	F	0.84	F	8.4		475		274		36.7		7.87		146.72		55.4	
May-02	1.9	F	0.84	F	15.2		488		317		37.5		7.76		148.5		58.5	
Jun-02	1.9	F	0.84	F	9.9		506		320		38		7.73		146.9		60.6	
Jul-02	2		0.84	F	10.2		506		321		38.5		7.43		146.7		62.6	
Aug-02	1.9	F	0.84	F	9.99		507		280		37.7		7.65		146.6		62.9	
Sep-02	0.72	F	0.12	F	9.7		515		323		40		7.62		146.4		59.1	
Oct-02	0.84			B	7.74		566		290		44		8.25		146.4		60.4	
Nov-02	0.72	F		B	14.2		651		382		53		7.76		146.35		58.6	
Dec-02	0.72	F		B	10.4		615		340		54		7.94		144.9		58.1	
Jan-03	0.96		0.28		11.2		616		346		45		7.68		146.2		55.2	
Feb-03	0.9			B	9.16		590		316		52.5		8.2		146.05		58.8	
Mar-03	1.04			B	9.73		611		320		50		7.98		146.11		58.8	
Apr-03	0.72	F		B	10.1		552		330		45		7.91		145.55		58.1	
May-03	0.72	F		B	8.82		546		280		42.5		7.91		146.07		57.7	
Jun-03	0.72	F	0.16		9.4		545		340		40.5		7.93		145.95		59.7	
Jul-03	1		0.14		8.09		547		308		44		7.54		145.77		66.9	
Aug-03	0.72	F		B	8.92		516		246		40.5		8.28		145.67		66.7	
Sep-03	1.78		0.42		8.64		576		250		20.99		8.34		145.56		65.3	
Oct-03	0.72	F		B	9.73		594		254		50		8.29		145.7		254	
Nov-03	1.16		0.12	F	9.49		566		264		47.5		7.94		145.34		62.4	
Dec-03	0.72	F	0.12	F	8.51		538		268		43.5		8.01		145.65		58.6	
AVG					9.3				303		39							

L = Empty
F = Less than
B = Below/Non detect
6 = conditional/not required
8 = Other
L = Empty

Lamb Weston New Farm

Wanapum Interflow Zone

DATE	MW16 TKN (as N) mg/L	QL	MW16 NH3 (as N) mg/L	QL	MW16 NO3 (as N) mg/L	QL	MW16 CONDUC umhos/cm	QL	MW16 TDS mg/L	QL	MW16 CHLORIDE mg/L	QL	MW16 pH s.u.	QL	MW16 DEPTH feet	QL	MW16 TEMP F	QL
Jan-99	0.2		0.1	F	20		969		667		108		7.83		154.4		58.1	
Feb-99	0.3		0.1	F	22.4		1040		720		103		7.3		153.5		59	
Mar-99	0.2		0.1	F	21.9		949		687		104		8.1		153.75		59	
Apr-99	0.2		0.1	F	21.7		997		688		104		8.3		153.93		58	
May-99	0.4		0.1	F	20.2		983		648		101		8.5		154.19		60.7	
Jun-99	0.2		0.1	F	21		996		608		99.7		8.5		154.07		60.8	
Jul-99	0.1	F	0.1	F	7.2		636		341		33.8		7.8		155.5		60	
Aug-99	0.3		0.1	F	20.9		892		728		102		8.2		155.6		60	
Sep-99	0.4		0.1	F	20.8		811		657		94.7		8.1		154.9		59	
Oct-99	0.3		0.1	F	25.9		913		633		112		7.8		154.02		59	
Nov-99	0.3		0.1	F	25.5		786		654		105		7.9		153.1		58	
Dec-99	0.1		0.7		24.5		894		696		97.5		7.9		154.85		58	
Jan-00	0.4		0.1	F	21.4		901		616		95.9		7.85		155.22		59	
Feb-00	0.2		0.1	F	21		946		709		107		7.8		153.61		58.5	
Mar-00	0.3		0.1	F	20.3		526		498		93.9		7.92		154.25		59.1	
Apr-00	0.4		0.1	F	19.3		864		277		92.8		7.9		154.2		60.4	
May-00	0.3		0.1	F	18.4		790		636		91.4		7.85		154.32		61.1	
Jun-00	0.3		0.1	F	19.4		733		589		95.3		7.8		154.56		60.6	
Jul-00	0.2		0.1	F	17.3		965		671		94		7.93		154.7		61.1	
Aug-00	0.3		0.1	F	18.4		877		613		91		8.2		154.51		60.4	
Sep-00	0.2		0.1	F	19.2		970		665		91.7		7.7		154.09		60	
Oct-00	0.2		0.1	F	20.4		968		613		90		7.9		153.53		59.2	
Nov-00	0.3		0.1	F	20.4		984		651		98		8.2		153.98		59.2	
Dec-00	0.3		0.1	F	18.9		900		677		89.2		7.8		154.26		58.2	
Jan-01	0.4		0.1	F	20.1		887		619		93.7		7.82		154.5		59.1	
Feb-01	0.3		0.2		19.2		874		606		88.9		7.9		154.55		59.7	
Mar-01	0.4		0.1	F	18.8		955		628		88.3		8.02		154.87		59.9	
Apr-01	2.1		0.1	F	18.1		912		591		89.1		7.93		155.09		59.4	
May-01	0.3		0.1	F	17.5		899		586		86.3		7.65		155.23		61.1	
Jun-01	1.1		0.1	F	18		969		762		90.2		8.05		155.26		60.3	
Jul-01	1.9	F	0.84	F	20.7		947		631		85.47		8.08		155.04		62	
Aug-01	1.9	F		B	21.6		931		613		84.7		8.6		154.55		62.9	
Sep-01	1.9	F	0.84	F	22.1		944		620		81.2		8.5		153.88		59.1	
Oct-01		B		B	20.7		942		654		84		7.87		153.62		57.5	
Nov-01	2.16		0.84	F	19.3		959		642		84.7		7.73		153.72		57.7	
Dec-01	2.28		0.84	F	21.5		949		568		83.2		7.64		153.86		57.2	
Jan-02	1.9	F	0.84	F	20.4		905		553		82.2		7.69		153.85		57.6	
Feb-02	1.9	F	0.84	F	17.6		916		560		79.2		7.9		154.51		56.8	
Mar-02	1.9	F	0.84	F	17		913		541		78.2		7.83		154.6		56.8	
Apr-02	2.36		0.84	F	14.3		956		560		77.2		7.17		154.67		57.6	
May-02	1.9	F	0.84	F	17.4		861		577		76.7		7.28		154.9		58.1	
Jun-02	1.9	F	0.84	F	17.1		963		637		76		7.66		154.6		59.2	
Jul-02	1.9	F	0.84	F	17.3		948		575		77.7		7.34		154.7		60.2	
Aug-02	1.9	F	0.84	F	18.5		961		527		79.5		7.17		154.75		59.7	
Sep-02	1.9	F		B	13		957		634		73		7.38		154.8		59	
Oct-02	0.72	F		B	14.1		942		506		76		7.65		154.65		57.4	
Nov-02	0.72	F		B	11.3		936		536		56		7.52		154.6		58.8	
Dec-02	0.74			B	11.4		939		538		76.5		7.39		154.6		61.3	
Jan-03	0.76			B	14.3		927		596		75		7.85		154.6		57.4	
Feb-03	0.96			B	13.4		929		516		75.5		7.86		155.1		57.9	
Mar-03	1.32			B	11.91		939		500		77		8.14		155.21		58.6	
Apr-03	1.9			B	12.81		937		560		76.5		7.71		155.42		59.4	
May-03	1.54			B	12.9		937		580		75.5		7.48		155.45		59	
Jun-03	1.7			B	14.2		937		508		75		7.66		155.35		60.8	
Jul-03	0.97			B	14.6		936		504		74		7.5		155.2		60.8	
Aug-03	1.3			B	14.45		929		474		74		7.79		155.15		60.8	
Sep-03	1.38		0.28		11.77		936		422		12.25		7.97		154.9		62.4	
Oct-03	0.72	F		B	12		903		444		75.5		7.86		155		67.3	
Nov-03	1.5		0.12	F	11.9		930		444		72		7.05		154.77		60.3	
Dec-03	0.72	F	0.12	F	11.1		936		398		72		7.97		154.9		59.7	
AVG					17.8				586		85							

L = Empty
F = Less than
B = Below/Non detect
6 = conditional/not required
8 = Other
L = Empty

Lamb Weston New Farm
T-Lake Interflow Zone

	MW12		MW12		MW12		MW12		MW12		MW12		MW12		MW12		MW12	
	TKN (AS N)		NH3 (as N)		NO3 (as N)		CONDUC		TDS		CHLORIDE		pH		DEPTH		TEMP	
DATE	mg/L	QL	mg/L	QL	mg/L	QL	umhos/cm	QL	mg/L	QL	mg/L	QL	s.u.	QL	FT	QL	F	QL
Jan-99	0.2		0.1	F	9.48		552		382		20.8		7.3		77		56.3	
Feb-99	0.2		0.1	F	9.61		585		376		21.3		7.3		79.3		56.3	
Mar-99	0.2		0.1	F	9.71		559		311		21.8		8.3		79.4		55.4	
Apr-99	0.2		0.1	F	9.43		559		370		21.8		8.4		79.73		56	
May-99	0.2		0.1	F	9.68		562		371		21.8		8.7		80.3		57.2	
Jun-99	0.2		0.1	F	9.5		593		338		22.4		8.7		81.02		57.2	
Jul-99	0.3		0.1	F	9.61		478		368		21.5		7.8		82		59	
Aug-99	0.2		0.1	F	9.23		558		404		21.2		8.4		81.6		57	
Sep-99	0.3		0.1	F	9.35		514		382		21.7		8.1		81.15		57	
Oct-99	0.2		0.1	F	9.51		503		364		21.5		7.5		80.8		55	
Nov-99	0.2		0.1	F	9.54		503		407		21.1		8.2		80.5		55	
Dec-99	0.2		0.67		8.95		493		381		19.7		7.9		80.02		55	
Jan-00	0.2		0.1	F	9.14		531		394		19.8		7.9		80.69		55.5	
Feb-00	0.2		0.1	F	9.22		525		400		19.7		7.95		79.45		57	
Mar-00	0.2		0.1	F	9.31		826		348		20		8.02		80.65		55.67	
Apr-00	0.2		0.1	F	8.97		519		389		19.7		8.1		80.9		55.6	
May-00	0.2		0.1	F	9.4		524		381		20.4		8		81.17		56.6	
Jun-00	0.1		0.1	F	9.62		455		358		21.4		7.95		81.42		56.3	
Jul-00	0.2		0.1	F	9.63		610		399		19.1		8.2		81.28		56.9	
Aug-00	0.2		0.1	F	9.29		546		374		18.6		8.32		80.85		57.1	
Sep-00	0.1		0.1	F	9.52		593		376		20.2		7.9		80.37		56.8	
Oct-00	0.1		0.1	F	9.4		560		366		19.2		8		79.88		56.5	
Nov-00	0.2		0.1	F	9.03		570		373		19.1		8.2		79		55.6	
Dec-00	0.2		0.1	F	9.38		543		390		19.1		8.15		79.55		55.3	
Jan-01	0.2		0.1	F	9.17		559		384		100	8	8.15		79.71		56	
Feb-01	0.4		0.1	F	9.3		546		376		19.2		8.17		80.42		55.4	
Mar-01	0.1		0.1	F	9.31		540		369		18.8		8.27		81.45		56.3	
Apr-01	0.5		0.1	F	9.39		578		379		19.1		8.25		81.72		56.4	
May-01	0.1		0.1	F	9.4		574		359		18.8		8.23		81.98		56.9	
Jun-01	0.8		0.1	F	9.62		600		392		19.3		7.7		81.87		57.4	
Jul-01	1.9	F	0.84	F	16		577		420		18.74		8.38		81.8		59.1	
Aug-01	1.9	F	0.84	F	11.7		591		414		18.7		8.5		81.66		56.6	
Sep-01	1.9	F	0.84	F	11		583		397		19.7		8.7		81.1		56	
Oct-01		B		B	10.1		569		401		18		8.32		80.51		54.7	
Nov-01	1.9	F	0.84	F	12.7		607		390		19.7		7.89		79.81		54.3	
Dec-01	1.9	F	0.84	F	11.3		596		354		19.7		8.06		78.71		54.1	
Jan-02	1.9	F	0.84	F	12.5		574		368		19.2		8.47		78.75		53.8	
Feb-02	1.98		0.84	F	10.4		590		371		18.7		8.23		79.44		53.2	
Mar-02	1.9	F	0.84	F	6.77		589		347		18.7		8.47		80.02		53.2	
Apr-02	1.9	F	0.84	F	8.98		636		324		18.7		7.54		80.5		54	
May-02	2.46		0.84	F	11.6		634		353		19.7		7.76		80.35		54.9	
Jun-02	4.35		0.84	F	11.2		637		370		20		7.8		80.7		55.2	
Jul-02	5.51		0.84	F	12		638		396		21.5		7.46		80.95		56.1	
Aug-02	1.9	F	0.84	F	15.2		644		359		22.5		7.14		81		55.4	
Sep-02	0.72	F		B	11.1		642		367		22.2		7.54		80.2		54.3	
Oct-02	0.72	F		B	12		655		354		22		7.85		79.9		54.3	
Nov-02	0.72	F		B	5.11		659		368		23		7.68		79		54.5	
Dec-02	0.72	F		B	9.88		651		376		23.5		7.63		78.45		55	
Jan-03	2.14			B	13.5		643		382		23		7.9		78.9		55.2	
Feb-03	1.54			B	9.16		661		376		24		8.22		79		54.7	
Mar-03	1.29			B	11.94		663		366		24.5		8.27		79.15		55.2	
Apr-03	0.94			B	13.5		671		374		24		7.82		79.51		54.7	
May-03	1.56			B	12.52		674		392		23.5		7.83		79.65		54.9	
Jun-03	0.72	F		B	13.67		682		414		24		7.77		79.56		59.2	
Jul-03	0.86			B	11.6		658		374		24.2		7.74		79.35		63.1	
Aug-03	0.72	F		B	15.04		674		312		84		8.03		78.75		59.9	
Sep-03	1.32		0.42		12.3		671		298		4.25		8.08		77.9		61	
Oct-03	0.72	F		B	12.4		674		326		23		8		77.09		58.3	
Nov-03	0.72	F	0.12	F	12.8		678		324		23.5		6.44		76.13		56.3	
Dec-03	0.72	F	0.12	F	12.2		678		338		23		8.18		75.97		55.9	
AVG					10.5				371		23							

L = Empty
F = Less than
B = Below/Non detect
6 = conditional/not required
8 = Other
L = Empty

Lamb Weston New Farm
T-Lake Interflow Zone

	MW18		MW18		MW18		MW18		MW18		MW18		MW18		MW18		MW18	
	TKN (as N)		NH3 (as N)		NO3 (as N)		CONDUC		TDS		CHLORIDE		pH		DEPTH		TEMP	
DATE	mg/L	QL	mg/L	QL	mg/L	QL	umhos/cm	QL	mg/L	QL	mg/L	QL	s.u.	QL	feet	QL	F	QL
Jan-99																		
Feb-99																		
Mar-99																		
Apr-99																		
May-99																		
Jun-99																		
Jul-99																		
Aug-99																		
Sep-99																		
Oct-99		6		6		6		6		6		6		6		6		6
Nov-99		6		6		6		6		6		6		6		6		6
Dec-99		6		6		6		6		6		6		6		6		6
Jan-00	0.4		0.1	F	4.7		378		255		37.6		7.82		76.32		57.2	
Feb-00	0.2		0.1	F	6.5		385		251		37.5		7.87		75.5		58	
Mar-00	0.2	F	0.1	F	6.4		364		266		36.7		8		77.2		58.05	
Apr-00	0.3		0.01	F	6.4		376		232		36.3		8		78.15		57.9	
May-00	0.2		0.1	F	6.8		359		276		37.7		7.95		79.53		59.1	
Jun-00	0.2		0.1	F	6.7		343		267		37.7		8.05		80.48		58.5	
Jul-00	0.3		0.1	F	7.2		368		300		42.5		7.95		81.26		59.3	
Aug-00	0.2		0.1	F	6.8		374		270		36.6		8.25		82.6		60.2	
Sep-00	0.2		0.1	F	5.8		587		368		44.9		7.85		48.32		58	
Oct-00	2.6		0.1	F	6.5		402		280		36.9		8.13		83.7		58.8	
Nov-00	2.4		0.1	F	6.9		372		214		37.8		8.5		84.55		53.2	
Dec-00	0.4		0.1	F	6.6		389		275		38.1		8.32		85.54		57.2	
Jan-01	0.7		0.1	F	7.7		417		272		43.6		8.07		85.32		57	
Feb-01	0.8		0.1	F	7.8		446		303		43.1		8.52		85.95		58	
Mar-01	0.2		0.1	F	9.26		478		347		53		8.35		85.31		58.5	
Apr-01	0.6		0.1	F	8.86		503		319		48.5		8.2		85.63		59.5	
May-01	0.1	F	0.1	F	11.3		657		393		62		7.83		82.19		59	
Jun-01	0.1	F	0.1	F	10.1		636		401		55.9		8.15		83.05		61.6	
Jul-01	1.9	F	0.84	F	9.92		552		373		48.73		8.28		84.3		60	
Aug-01	1.9	F		B	9.12		532		342		49.2		8.8		85.5		62.6	
Sep-01	1.9	F	0.84	F	9.04		515		299		44.7		8.8		86.66		63.1	
Oct-01	1.9	F		B	10.1		508		311		43.2		7.91		86.29		56.1	
Nov-01	1.9	F	0.84	F	10.3		506		316		43.7		8		86.6		54.3	
Dec-01	1.9	F	0.84	F	9.02		493		295		43.7		8.22		86.66		56.5	
Jan-02	1.9	F	0.84	F	9.42		477		286		43.7		8.47		86.09		55.9	
Feb-02	1.9	F	0.84	F	8.38		474		284		43.2		8.47		86.61		57.6	
Mar-02	1.9	F	0.84	F	8.82		476		288		42.7		8.35		85.56		50.9	
Apr-02	1.9	F	0.84	F	7.24		505		271		41.7		7.84		85.1		55.1	
May-02	1.9	F	0.84	F	8.19		509		294		41.7		7.79		85.45		60.6	
Jun-02	1.9	F	0.84	F	6.61		504		258		40		7.58		85.35		57.9	
Jul-02	1.9	F	0.84	F	7.69		508		292		39		7.45		85.2		56.7	
Aug-02		B	0.84	F	7.57		501		252		36.2		7.45		85.1		56	
Sep-02	0.72	F	0.12	F	6.8		494		270		36.5		7.58		85.1		55.9	
Oct-02	0.72	F		B	4.3		488		254		37		7.57		84.95		56.3	
Nov-02	0.72	F		B	8.4		489		274		35		7.56		85.2		56.6	
Dec-02	0.72	F		B	6.13		493		268		37.5		7.74		83.7		56.3	
Jan-03	0.84			B	6.23		496		278		36.5		7.58		84.9		56.1	
Feb-03	1.07			B	5		491		256		37		8.07		84.75		58.5	
Mar-03	0.92			B	5.54		481		259		37.5		7.89		84.84		56.5	
Apr-03	0.72	F		B	6.69		490		264		37		8.04		84.32		57.4	
May-03	0.72	F		B	6.55		510		248		38.5		8.31		84.86		57	
Jun-03	0.72	F	0.12	F	5.85		476		282		36		7.7		84.79		60.2	
Jul-03	0.86		0.13		5.26		476		268		38.5		7.6		84.72		63.9	
Aug-03	0.72	F		B	6.24		478		192		38		8.2		84.87		62.8	
Sep-03	0.96		0.4		5.42		476		200		15.25		8.33		84.86		62.4	
Oct-03	0.72	F	6.53	B	6.53		485		206		36.5		8.26		84.96		60.6	
Nov-03	0.72	F	0.12	F	6.04		487		220		37		7.73		84.7		60.3	
Dec-03	0.72	F	0.12	F	5.7		496		232		35		8.23		84.77		57.4	
AVG					7.3				280		40							

L = Empty
F = Less than
B = Below/Non detect
6 = conditional/not required
8 = Other

Lamb Weston New Farm
T-Lake Interflow Zone

	MW19		MW19		MW19		MW19		MW19		MW19		MW19		MW19		MW19	
	TKN (as N)		NH3 (as N)		NO3 (as N)		CONDUC		TDS		CHLORIDE		pH		DEPTH		TEMP	
DATE	mg/L	QL	mg/L	QL	mg/L	QL	umhos/cm	QL	mg/L	QL	mg/L	QL	s.u.	QL	feet	QL	F	QL
Jan-99																		
Feb-99																		
Mar-99																		
Apr-99																		
May-99																		
Jun-99																		
Jul-99																		
Aug-99																		
Sep-99																		
Oct-99		6		6		6		6		6		6		6		6		6
Nov-99		6		6		6		6		6		6		6		6		6
Dec-99		6		6		6		6		6		6		6		6		6
Jan-00	0.2		0.1	F	6.2		579		356		43.4		7.85		50.21		58	
Feb-00	0.2		0.1	F	6.7		544		391		44		7.9		49.1		58.7	
Mar-00	0.2		0.1	F	6.2		549		366		45.4		7.9		49.55		57.77	
Apr-00	0.2		0.1	F	6.4		564		390		47		7.9		49.81		59.2	
May-00	0.4		0.1	F	6.5		530		412		49.4		7.9		49.58		59.8	
Jun-00	0.2		0.1	F	6.4		531		396		46.3		7.8		49.49		59.2	
Jul-00	0.3		0.1	F	6.8		589		445		56		7.9		49.02		60.8	
Aug-00	0.2		0.1	F	6.2		581		374		45.4		8.2		48.76		59	
Sep-00	0.2		0.1	F	5.8		587		368		44.9		7.85		48.32		58	
Oct-00	0.1		0.1	F	5.6		540		609		43.8		7.9		47.97		59.6	
Nov-00	0.4		0.1	F	5.3		525		356		38.6		8.2		47.85		57.1	
Dec-00	0.3		0.1	F	4.8		522		341		36.6		7.85		48.49		57.4	
Jan-01	0.2		0.1	F	5		489		340		38.2		7.92		48.8		57.6	
Feb-01	0.3		0.1	F	5.1		509		328		37.5		8.1		49.42		57.3	
Mar-01	0.7		0.1	F	5.1		532		338		38.7		8.25		50.29		58	
Apr-01	0.2		0.1	F	5.2		468		347		40.5		8.18		50.36		56.6	
May-01	0.3		0.1	F	5.16		586		304		40.4		7.9		50.3		62.8	
Jun-01	0.7		0.1	F	5.23		588		330		42.5		8		50.1		59.4	
Jul-01	1.9	F	0.84	F	5.39		565		330		38.24		8.28		49.73		60	
Aug-01	1.9	F		B	5.3		569		379		40.2		8.6		46.38		60.8	
Sep-01	1.9	F	0.84	F	6.28		554		361		38.2		8.7		48.72		59.3	
Oct-01	1.9	F		B	5.58		535		333		38.7		8.12		48.46		55.8	
Nov-01	1.9	F	0.84	F	3.57		560		330		37.2		7.84		48.18		56.3	
Dec-01	1.9	F	0.84	F	5.75		539		306		36.7		7.96		48		55.4	
Jan-02	1.9	F	0.84	F	6.15		505		306		35.7		8.34		48.5		55.6	
Feb-02	1.9	F	0.84	F	5.92		520		308		35.7		7.92		49		55.4	
Mar-02	1.9	F	0.84	F	4.8		536		308		38.2		8.06		49.72		54.1	
Apr-02	1.9	F	0.84	F	5.22		585		282		38.7		7.47		49.75		55	
May-02	1.9	F	84	F	5.7		581		326		40.2		7.46		49.4		56.3	
Jun-02	1.9	F	0.84	F	6.1		579		349		25.7		7.52		49.3		62.7	
Jul-02	1.9	F	0.84	F	5.31		606		364		43.5		7.22		48.9		59.5	
Aug-02	1.9	F	0.84	F	6.9		614		296		44.5		7.24		48.7		58.5	
Sep-02	0.72	F		B	5.69		619		332		44		7.36		48.15		58.6	
Oct-02		B		B	6.45		317		318		45		7.71		48		56.6	
Nov-02	0.72	F		B	5.6		617		332		45.5		7.53		47.8		57.2	
Dec-02	0.72	F		B	3.92		617		338		44		7.47		48		57.4	
Jan-03	0.72	F		B	6.29		589		340		43		7.87		48.7		57	
Feb-03	0.9			B	3.78		605		324		44		8.18		48.9		56.7	
Mar-03	0.94		6.49		5.88		625		320		47		8.24		49.08		56.7	
Apr-03	1.38			B	6.86		673		414		55		7.86		49.3		56.3	
May-03	0.89			B	8.37		692		426		58.5		7.6		49.1		57	
Jun-03	1.04			B	7.87		701		416		58		7.64		48.55		59.7	
Jul-03	3.1			B	6.22		700		350		58		7.59		48		63.5	
Aug-03	0.72	F		B	8.09		697		336		58		7.9		47.57		64.2	
Sep-03	1.04		0.31		6.7		704		294		7.5		7.93		47.2		60.6	
Oct-03	0.72	F		B	6.61		701		318		53.5		7.67		46.98		59.2	
Nov-03	1.76		0.12	F	6.25		694		312		53.5		6.67		46.86		57.9	
Dec-03	0.72	F	0.12	F	6.01		690		314		53.5		8.11		47.1		53.5	
AVG					6				351		43							

L = Empty
F = Less than
B = Below/Non detect
6 = conditional/not required
8 = Other

Table A. Proposed Soil Monitoring for LWC and Paradise Fields [1]

Soil Monitoring Schedules			Fall [2]	Spring [2]	Monthly [3]	Once Per Cycle [4]
Parameter	Units	Sample Point	Depth Increments [5]			
Nitrate (as N)	mg/Kg	Each field	1,2,3,4,5	1,2,3,4,5		1,2,3,4,5
Ammonium (as N)	mg/Kg	Each field	1,2,3,4,5	1,2,3,4,5		1,2,3,4,5
Soluble Salts (ECe)	mmho/cm	Each field	1,2,3,4,5	1,2,3,4,5		1,2,3,4,5
Soil Moisture	inches	Each field	1,2,3,4,5	1,2,3,4,5	1,2,3,4,5	1,2,3,4,5
Available P (as P)	mg/Kg	Each field	1			1,2,3,4,5
Sulfate (as S)	mg/Kg	Each field	1			1,2,3,4,5
ESP	%	Each field	1			1,2,3,4,5
pH	s.u.	Each field	1			1,2,3,4,5
Exchangeable Sodium	meq/100g	Each field	1			1,2,3,4,5
Exchangeable Calcium	meq/100g	Each field	1			1,2,3,4,5
Exchangeable Magnesium	meq/100g	Each field	1			1,2,3,4,5
Exchangeable Potassium	mg/Kg	Each field	1			1,2,3,4,5
Organic Matter	%	Each field	1			1
TKN	%	Each field				1

Notes:

1 LWC Fields include C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, WL11, WL12, WL13, WL14, HL5 and HL10.
Paradise Fields include P1, P2, P3, P4, P5, P6, P7, P8, and P9.
LWC Old Fields nutrient status will be represented by samples from Fields A, D, F and L collected once each fall and tested for nitrate-nitrogen, ammonium-nitrogen and soluble salts by conductivity of saturation paste extract.

2 Fall samples will be collected to represent soil conditions near the end of the crop growing season. Spring samples will be collected to represent soil conditions after the winter period and prior to the primary crop growing season. A minimum of six subsamples will be collected and composited to represent each depth increment

3 Soil moisture monitoring will be conducted approximately monthly to aid irrigation management and annual reporting, not as compliance. Additional monitoring may be performed at the discretion of Lamb-Weston. Soil moisture monitoring is via in-place access tubes at 1 to 2 locations per field by portable soil moisture measurement equipment.

4 Once per permit cycle in the fall prior to permit expiration (e.g., fall 2008 prior to permit renewal).

5 Depth increments refer to the following: 1 = 0-12 inches, 2 = 12-24 inches, 3 = 24-36 inches, 4 = 36-48 inches, 5 = 48-60 inches. Samples will be collected to 5 feet or refusal.

Abbreviations:

N = nitrogen, ECe = electrical conductivity of a saturation paste extract, TKN = total Kjedahl nitrogen, P = phosphorus (Olsen's or Morgan's extract depending on soil pH), S = sulfur, ESP = exchangeable sodium percentage.

Farm Drain

	MWF		MWF		MWF		MWF		MWF		MWF	
	TKN (as N)		NH3 (as N)		NO3 (as N)		TDS		CHLORIDE		pH	
DATE	mg/L	QL	mg/L	QL	mg/L	QL	mg/L	QL	mg:	QL	s.u.	QL
Jan-99	0.3		0.1	F	1.72			E	16		8.2	
Feb-99												
Mar-99												
Apr-99	0.6		0.1	F	0.58		175		6.5		9.2	
May-99												
Jun-99												
Jul-99												
Aug-99	0.3		0.1	F	0.12		164		3.2		8	
Sep-99												
Oct-99												
Nov-99												
Dec-99												
Jan-00	0.4		0.1	F	1.61		430		27.7		8.1	
Feb-00												
Mar-00												
Apr-00												
May-00												
Jun-00												
Jul-00												
Aug-00												
Sep-00												
Oct-00												
Nov-00	0.4		0.1	F	0.6		413		19.5		8.1	
Dec-00												
Jan-01	0.5		0.1	F	0.68		372		13.6		7.8	
Feb-01												
Mar-01												
Apr-01	0.4		0.1	F	0.57		374		16.5		8.3	
May-01												
Jun-01												
Jul-01												
Aug-01	1.9	F	0.84	F	0.15		301		5.2		7.8	
Sep-01												
Oct-01												
Nov-01	1.9	F	0.84	F	0.36		443		13.7		8.1	
Dec-01												
Jan-02	1.9	F	0.84	F	1.03		338		13.7		9.1	
Feb-02												
Mar-02												
Apr-02	1.9	F	0.84	F	0.47		295		9.75		8.1	
May-02												
Jun-02												
Jul-02												
Aug-02	1.9	F	0.84	F		B	327		8.75		7	
Sep-02												
Oct-02												
Nov-02	0.72	F		B		B	362		11.2		7.83	
Dec-02												
Jan-03	0.94		0.25		0.58		352		16.5		8	
Feb-03												
Mar-03												
Apr-03	1.14			B	0.66		372		21.49		8.4	
May-03												
Jun-03												
Jul-03												
Aug-03	0.72	F	0.12	F	2.39		334		8.75		7.75	
Sep-03												
Oct-03												
Nov-03	0.72	F	0.12	F	0.46		344		10		8.54	
Dec-03												
AVG					0.8		337		13			

F = less than
B = below/non detect